ELECTRICAL WORLD

A consolidation of Electrical World, Electrical Engineer and American Electrician

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What in the World!

General Johnson is becoming impatient. He desires more codes for NIRA. The General now plans to bring public sentiment to bear on industry. This will bring results.

●

Last week we published the N.E.M.A. code in full. It was approved Wednesday and appeared in "Electrical World" Saturday morning. We believe in weekly news service.

●

A comic opera is occurring in Georgia. The Governor, spurred on by the labor leaders, is trying to oust the utilities commission. Legal rules of procedure may not be followed, but a great airing is had of grievances and of irrelevant testimony. The audience enjoys "Georgia Frivolities" very much, according to press reports.

●

What a change. The government now milks the cows, raises the crops, makes the machines and fixes the payrolls for the country. Yet we seem to remember a presidential campaign slogan, "Keep the government out of business." How we do grow and change.

●

Yes, we attended the N.E.M.A. Code hearing on the 19th, but wait until next week to make our usual comments on this page. It takes time to grow accustomed to these things.

●

Reports indicate an employment and increased wage drive for the summer by the Administration. We are for it, especially the wage part. We can use the money and increase our purchasing power with little effort.

Artificial light improves appearance of plant

JULY 22, 1933

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ELECTRICAL WORLD

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for the Week Ending

July 22, 1933

Labor and Small Manufacturers Oppose Electrical Code

ELECTRICAL manufacturers presented their code in three sessions, presided over by Deputy Administrator Allen, in Washington on July 19. J. S. Tritle, vice-president of the Westinghouse company and president of N.E.M.A., presented the code on behalf of the electrical manufacturers. He stated that it represented in excess of 75 per cent of the industry, consisting of 300 companies and some 60 sections determined by product classifications. Judge Francis Neagle then read the code. C. L. Collens outlined the manufacturers' point of view and said that the manufacturers had an average volume of only one-quarter the 1929 volume for the first half of this year, but employed 50 per cent of the 1929 number of employees. Any improvement must come from increased capital goods business.

Under the code it is estimated that a business increase to 60 per cent of the 1929 volume would employ the same number of workers as in 1929. The minimum wage of the code would increase the wages of about 20 per cent of the employees. G. W. Mason of the Kelvinator company explained that the 144-hour-per-year tolerance was stated as the best way to cover peak or seasonal labor demands. Deputy Administrator Allen then opened the meeting for discussion.

Sections advocate separate codes

The Vacuum Cleaner Manufacturers Association, the Radio Manufacturers Association, the Washing Machine Manufacturers Association and the Battery Manufacturers Association went on record in favor of the development of individual codes for their respective associations, and protested against inclusion in the N.E.M.A. code. Administrator Allen pointed out the difficulty of administering separate codes and suggested that these associations might consult with the N.E.M.A. committee to change the code to give them more power and responsibility as divisions of the industry and yet work under a single industry administration. This suggestion met with general approval. C. D. Jackson objected to the inclusion of gas refrigerators in the code. The independent group of lamp manufacturers objected to inclusion in the code and desired a separate code, both because they were not consulted in formulating the code and because they claimed it did not satisfy the peculiar conditions encountered in lamp manufacture. H. L. Gary suggested that manufacturers of telephone equipment be consulted on the code or be permitted to develop a separate code. Electrical Wiring Device Manufacturers Association also requested permission to be excluded from the code in order to develop a separate code.

I.B.E.W. wants 90-cent minimum

Labor made strong representations against the minimum wage, the exceptions to the minimum and the 36-hour week. Representatives of the International Brotherhood of Electrical Workers asked for a minimum of 90 cents an hour for skilled workers, a 30-hour week and an investigation of the use of piece work and incentive schemes in the industry. President Green of the American Federation of Labor said the minimum wage was entirely too low, that there should be no exceptions and that a 30-hour week should be stated. He said the minimum rate in the code was less than that paid in the textile industry and less than that now paid in the manufacturing industry except in the case of women workers. He cited data to show that present hours of work were only 30 per week and argued that the code would neither raise wages nor increase employment, as was the primary intent of the act.

The Wheeler Insulated Wire Company stated that the act would cause 55 per cent unemployment instead of present full employment in its plant because of full capacity business and the absence of any excess skilled workers, and the Belden Manufacturing Company claimed the code discriminated against a small company in favor of a large company because of the wage and hours of labor provisions. The small but high quality producing plant in low-wage-rate areas would be penalized and deprived of its only present advantages for competing with the large companies.

Representatives of several unions also spoke. The hearings were held up to a late hour Wednesday night and were expected to be completed Thursday.

▼

McNinch Named Chairman Federal Power Commission

Frank R. McNinch, vice-chairman of the Federal Power Commission for several months, has been appointed chairman of that body to succeed George Otis Smith, who vacated that position in acquiescence to the desire of President Roosevelt to have a man of his own selection. Mr. Smith's resignation was only as chairman, but it is expected in authoritative circles that he will leave the commission entirely within 90 days. Mr. McNinch's designation as chairman was confirmed by the commission by a unanimous vote. The commission then selected Basil Manly, who was appointed in May by President Roosevelt, as vice-chairman. Mr. Smith was for nearly twenty-five years director of the Geological Survey. It was in 1930 that he became chairman of the commission.

Mr. McNinch, who is a native of

Charlotte, N. C., became a member of the commission early in 1931. In his first statement as chairman he said: "It is a happy circumstance to me that my course during my two and a half years' service as a commissioner is in harmony with the President's views with regard to this vital public question. Power is a necessity in the present state of society and the power industry is a social agency, indeed a governmental agency where hydro-electric power is involved. Though privately administered, its administration is a public trust in the interest of the consuming public. This industry offers no fair field for stock jobbing, intercorporate trafficking or any other exploitation of the public. Every dollar honestly invested is entitled to a fair return and no more; every dollar paid by the consuming public is entitled to a full return in service and no less . . ."

▼

Values Debated in Municipal Condemnations

Declaring that if municipalities continue to condemn and take over electrical distributing facilities within their corporate limits rural districts will be compelled to forego the use of electricity, two members of the California State Railroad Commission dissented in an opinion signed by three commission members which places a value upon the distribution facilities of the Southern California Edison Company, Ltd., in the city of Tulare, Calif.

The decision is the outgrowth of an application filed by Tulare in which a valuation of Edison company properties was sought looking toward condemnation. The commission found a value of $200,000 for the property, to which it added $28,700 as severance damages. Factor in the findings was the offer by the city of a contract to purchase power at wholesale from the Edison company for a period of seven years. Experts for the utility placed the value at an amount ranging between $433,700 and $553,700.

Commissioner Leon O. Whitsell, in dissenting, held that the value set by the commission did not reflect just compensation for a property which showed annual net earnings of at least $38,209 and that the wholesale power purchase contract offered by the city could not be considered as an allowance which might offset actual severance damages. He said:

"In my judgment neither just compensation nor adequate severance damages have been fixed in this case. This failure on the part of the commission will ultimately result in injury, not only to the stockholders of the company, but also to the consumers remaining on its lines after the property is taken.

"If the municipalities continue to condemn and take over the electrical distributing facilities within their corporate limits and thereby throw the greater burden of system maintenance and costs upon the backs of our rural population, the time is not far distant when that burden will become too great and agriculture will be compelled to forego the use of electrical energy or the utilities will be compelled to furnish electrical energy at a rate figure which would not return sufficient compensation to warrant the maintenance of the systems. Such taking of utilities' facilities with the resultant disintegration of utility systems will likewise be injurious to the urban as well as to the rural communities."

In an opinion concurring on the findings and order Commissioner M. B. Harris approved the view expressed by Commissioner Whitsell as to the "disastrous consequences of splitting utility systems into fragments."

In a second dissenting opinion Commissioner Wallace L. Ware said, "we see in this proceeding a city forever removing some of the cream from a privately owned utility. It seems reasonable to me that when you buy cream you should pay cream prices." He held that a fair value was $348,942, which is twice the reproduction cost new less depreciation. He condemned "the widespread operation of this policy of sharpshooting the lucrative spots of utility properties at the city's lowest bid."

"Such a practice works greater havoc upon the legitimate investor in utility securities. The general enactment of this plan would threaten the stability of hundreds of millions now soundly invested and might imperil the perpetuity of utility structures throughout the entire state. These comments emanate from a simple recognition of the fact that a sound regulation primarily conceived to safeguard the consumer must likewise afford impartial refereeing when the consumers become aggressors," Commissioner Ware said.

▼

Boston Street Lights May Be Restored

About 2,400 street lights out of a total of 7,200 had been discontinued in Boston as part of the economy program put into effect by Mayor James M. Curley. City councilors have been flooded with protests from all sections that the reduced lighting has been an incentive to crime.

Spurred by these protests, the Council passed unanimously an order calling upon acting Mayor Joseph McGrath to recommend to the Council an emergency appropriation of $100,000 to permit the restoration of current to the darkened lights.

General Johnson for Industry Self-Government

At a meeting of the Associated Business Papers, Inc., which was held in Washington on July 14 General Johnson of NIRA addressed the editorial group and explained the policy and purpose of NIRA. An abstract of his formal statement follows:

"The first phase of the operation of this law is to spread employment and try to create a consuming power for the greatest market in the world, which we undoubtedly have. The first thing to do—never losing sight of the main purpose of this act—is to put these people back to work. If you don't do that you are going to have a crash."

Several questions were then asked and answered. General Johnson said: "Capital goods industries will benefit in a degree from the public works program. All industries go up and down together. There has been a great deal of neglect and obsolescence in this country which will have to be rebuilt. Of course the capital goods industries will receive the benefit. They are always slower than others. I don't know how we can speed them up. We cannot change the economic principles."

Asked if he discouraged modernization of plants, he said: "No I think that the necessary installation of new equipment should go forward. If you stopped inventiveness and progress, that would be very stupid. I do think that for a short period it would be wise to not emphasize the installation of machinery that would tend to further reduce employment. It is not our purpose here to stop economic progress."

When asked about unionization, General Johnson said: "As far as this organization is concerned I have said over and over again that it would not be used as an instrumentality for the unionization of any industry. . . . Both sides jumped the gun. The NIRA act is clear on the labor provisions."

▼

International Combustion Sale Valid

With one modification, the Federal Circuit Court of Appeals this week affirmed the decrees of sale of the properties of International Combustion Engineering Corporation to International Combustion, Inc., a new company formed by Superheater Corporation. The court held that the sale was valid and that there was no abuse of discretion by the District Court, but modified the decrees to this extent. The court remanded to the District Court for further consideration the 30,000 shares of International Combustion, Ltd., stock allowed to Hayden, Stone & Company as compensation for underwriting the new corporation's stock.

Intricate Accounting Rouses Objections

Continuously revised inventories for fixed capital purposes are more expensive to install and maintain than is justified by their values as an operating adjunct. This was asserted by B. S. Rodey, assistant auditor of the New York Edison Company, in assailing the requirement of infinite detail in the new uniform system of accounts for electric utilities promulgated by the New York Public Service Commission. In his testimony at the opening hearing he said it cost $7.35 per $1,000 of fixed capital to assemble and price the $73,940,000 inventory of the United Electric Light & Power Company, which took three years (1920-22) to do the field work alone. To list the plant items cost $248,000 and to fix the original cost or estimate it cost another $297,000. To maintain such records up to the minute as required by the new rules would cost practically $100,000 a year.

Crediting and debiting the fixed capital account every time a meter is removed and reinstalled would be another costly requirement of the new rules. Mr. Rodey said it would cost 16 cents for each of the Edison company's 849,000 meters to revise the present complete meter inventory and history cards to conformity with the new provisions. He urged that the present practice of leaving a meter charged to fixed capital until retired be continued as a perfectly adequate procedure.

Other outstanding innovations are the requirement of separate records for each "plant," meaning "each separate generating station, substation, storage battery station, transformer station and transmission line and also the distribution system located in each city, village, town or lighting district." Most revolutionary of all, however, is the stipulation that the retirement reserve policy be abandoned and straight depreciation be substituted throughout. The proposed rules, unless modified as a result of the hearings, will go into effect January 1, 1934.

▼

Morgan States Tennessee Policy

Fairness will be shown to "both the power companies and the public" in activities of the Tennessee Valley Authority, according to Dr. Arthur E. Morgan, chairman, who, with other members of the authority, inspected Muscle Shoals and the site of Cove Creek dam recently. He said that since the "power companies already occupy the territory" he could see no reason why parallel transmission lines should be built if an agreement could be made with the power companies.

Dr. Morgan reported that more than 100 cities of the region with a population of 1,000,000 already have asked the authority how to apply for power from dams which will be under its control. He expressed the importance of permanent development in the Tennessee Valley experiment.

"It must be developed on a permanent basis, slow and not speculative," he explained. "If the people are wise they will aid the development along the lines laid down by the President. If there is exploitation the country will get rid of it. Solid preparation is most essential. It is necessary to be right before going ahead."

▼

G. E. Sales Billed Dropped Only 23% in 1933

Orders received by the General Electric Company in the second quarter of 1933, announced by President Gerard Swope, amounted to $35,539,858, compared with $35,304,070 in the corresponding quarter last year, an increase of about 1 per cent. Orders for the first six months of 1933 amounted to $61,051,502, compared with $68,708,712 for the first half of 1932, a decrease of 11 per cent.

Sales billed for the first six months of 1933 amounted to $61,773,414.19, compared with $80,210,489.15 for the corresponding period last year, a decrease of 23 per cent.

Profit available for common stock for the second quarter of 1933 was $2,471,030.95, equivalent to 9 cents per share, or slightly less than the quarterly dividend of 10 cents per share to be paid on July 25.

The profit available for common stock for the first six months of this year was $4,666,080.69, compared with $7,653,187.61 for the first six months of last year. This profit is equivalent to 16 cents per share for the first six months of 1933 and 27 cents per share for the first six months of 1932 on 28,845,927 shares outstanding in both periods.

Washington Shocks Cause No Shivers

High-voltage emissions from Washington continue to disintegrate the depression. The latest is a come-one, come-all campaign to shorten hours and raise wages irrespective of NIRA codes and business conditions — a sort of love labor holiday until fall to increase employment and purchasing power. This is a good idea, but how can those business enterprises now in the red and with sales sufficient to give their men only twenty hours a week sing in harmony? However, perhaps the next bolt from Washington will sell goods for the primary industries and thus again prove the omnipotence of government in business.

Hear! Hear! Dr. Morgan finds Cove Creek full of holes and caves and has the temerity to call for a survey lest the government build a $50,000,000 well instead of a dam. Why doesn't Senator Norris say the power trust has been using dynamite at this site? And while Cove Creek waits, why doesn't the Columbia basin overflow Washington?

But now to actual business. It is truly astonishing to find all gages holding steady against the normal seasonal slump. Vacant shelves are still being filled. Inquiries and small orders for electrical goods continue from all parts of the country. The South and the Pacific Coast join the chorus to acclaim increased energy output. Refrigerators continue to sell like hot dogs. Basic national indexes increase or hold steady. These things are real, they act as tangible depression erasers and, for the electrical industry, there are no immediate clouds on the horizon. Electrical men are optimistic again.

World Power Conference Notes

Diesel engines will soon be built in units up to 45,000 or 60,000 hp., Dr. H. H. Blache told those who attended the Scandinavian sectional meeting of the World Power Conference which opened at Copenhagen on June 26 with subsequent sessions at Stockholm and Oslo. At Copenhagen they saw the world's largest Diesel, a 22,500-hp. engine at the H. C. Oersted municipal power station. At one of the sessions A. Chorlton said that Diesel-electric practice on Britain's railways had established the following in comparison with steam locomotives: Better fuel economy, lower water consumption, lower train weight, higher power at low speeds, more suitable for intermittent service, longer working hours, less time out for fueling, cleaning and maintenance, simple tandem operation with one crew, better outlook for high-speed service.

Sidney Withington of this country said that Diesel-electric locomotives, while higher in cost than steam, had justified the expenditure for branch lines involving an annual mileage of 30,000 or more. In reviewing (paper No. 94) the history of the New Haven electrification he put emphasis on the indirect advantages of electric over steam traction. One of the most important has been the great enhancement in value of terminal lands.

In the industrial power section H. Kind's paper (No. 71) cited German tendency toward individual and small-group drives. For driving the live rolls of certain types of mill the acceleration alone determined the rating of the squirrel-cage motors used and he recommended that the breakdown torque should come with about 90 per cent slip. The electric heating section brought out (in Dr. C. T. Buff's paper, No. 106) that the trend in German arc furnaces is toward lighter construction, larger units and less charging time.

Coming Meetings

National Electrical Wholesalers Association—Buffalo, N. Y., August 14-19. E. Douald Tolles, 165 Broadway, New York.

Illuminating Engineering Society—Delavan, Wis., August 28-31. D. W. Atwater, 29 West 39th St., New York.

Rocky Mountain Electric Association—Santa Fe, N. M., September 11-13. George E. Lewis, Gas and Electric Bldg., Denver, Colo.

International Association of Electrical Inspectors—Chicago, Ill., September 11-15, V. H. Tousley, 612 No. Michigan Avenue, Chicago.

National Electrical Exposition — New York, N. Y., September 20-30. Ralph Neumuller, 480 Lexington Ave., New York.

National Association of Railroad and Utilities Commissioners — Cincinnati, Ohio, October 10-13. James B. Walker, 270 Madison Ave., New York.

Association of Iron and Steel Electrical Engineers — Pittsburgh, Pa., October 17-19. John F. Kelley, Empire Building, Pittsburgh.

▼

Transfer of California Properties Held Up

The Los Angeles (Calif.) City Council has ratified resolutions of the Municipal Water and Power Commission which establish the form of contract and procedure for the purchase by the city of the Mono Basin and Owens Gorge properties and water rights of the Southern Sierras Power Company at a price of $6,950,000. The plan, as approved by the Council, includes payment by the city to the water and power department of $840,000 for unmetered water service for the fiscal year and the return by the department to the city's general fund of $525,000 for interest and sinking fund charges on St. Francis Dam disaster bonds.

A special committee of the Water and Power Commission, including A. F. Southwick, vice-president of the commission; H. A. Van Norman, general manager and chief engineer of the Department of Water Works and Supply, and E. F. Scattergood, general manager and chief engineer of the Bureau of Power and Light, will proceed to draw up the contract for the land purchase, which, it is stated, will in nowise affect the power rights of the company. The proposal to purchase the Southern Sierras Power Company ranch properties, along with its irrigation water rights, has been under discussion for about five years past. The purchase has been advocated to make possible a considerable increase in the city's water supply.

Coincident with the action of the City Council, suit was filed in the county Superior Court asking an injunction restraining the water and power department from paying more than $500,000 for water rights in the Mono Basin. The action was brought by Will H. Perry, a taxpayer, who asserted the lands are not worth more than $500,000, and that the interested parties have conspired to deceive city officials.

Negotiations between the city and the power company have been under consideration almost continuously during the past five years and seemed to culminate two years ago, when the city voted $38,500,000 in bonds, including an item of $7,000,000 for the purpose of this purchase and other sums for diversion works in the basin, enlargements of the Owens River aqueduct, purchase of water rights in the Bishop district and the enlargement of municipal water storage facilities.

▼

California Voters Scrap Dual Taxation

California's system of dual taxation whereby costs of state government have been borne since 1910 by a gross revenue tax levied against public utilities was scrapped by the voters of that state in the June 27 election. After January 1, 1935, all operative property of the public utilities now exempt from local taxation would be returned to the tax rolls and subject to taxation in the same manner as local property.

Electric light and power companies in California paid a state tax of 7½ per cent of gross revenues in past years, but the rate was temporarily raised by the last Legislature to 9 per cent for the 1933-1935 biennium. Under the plan just voted the public utilities and their franchises are to be taxed the same as business corporations and are also subjected to pay for special franchises or privileges granted them by governmental units. The public utilities, however, are not subject to any tax or license charge different from or at a higher rate than that imposed upon mercantile, manufacturing and business corporations doing business within the state.

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Intercompany Loans Approved

Petition of the Lowell Electric Light Corporation to loan $150,000 to the Malden Electric Company and $50,000 to the Beverley Gas & Electric Company on promissory notes payable within six months and bearing interest at rate of 3 per cent was approved last week by the Massachusetts Department of Public Utilities. The Lowell company at present has more than $200,000 on deposit in banks which, pursuant to the provisions of the banking acts of 1933, pay no interest on commercial deposits. It will not be necessary for the corporation to use this money during the period of the proposed loans. The Malden and Beverly companies desire to borrow the money for the purpose of meeting at maturity loans made to finance temporarily additions and improvements to plant and property.

Light Opera Continues in Georgia

Governor Talmadge's personally conducted trial of the five members of the Georgia Public Service Commission, which has at times attained the dignity of a light opera, went into its second week July 8. On the opening day the trial became a hearing at which everybody with a real or fancied grievance against either the Georgia Public Service Commission or Georgia Power Company could get themselves in print and it has remained at that level ever since.

Among those appearing at the hearing have been an ice company president who charged that he saw a copy of the 1932 rate schedule revision in the hands of an official of the Georgia Power Company before it was made public; a machinery manufacturer who stated that he moved to another city because the Georgia Power Company rates were too high; several bus line officials who stated that they presented members of the Georgia Public Service Commission with passes, while said officials claimed they thought they could save money for the state by using passes; a civil and mechanical engineer who claimed that the $7,000,000 which the commission claims it has saved the public through rate reductions was a lot of boloney, with the real saving in that time only of about $400,000, and last, but by no means least, a housewife who claimed that she was induced to put in an electric stove, and then had to take it out because it cost too much when a 3-cent rate was dropped.

Back of it all, of course, is the fight of long standing existing between the Georgia Power Company and the Georgia Federation of Trades, which, the power company claims, is trying to "get at" the Georgia Power Company through the elimination of the present commission and the appointment of one more favorable to the ends it has in view.

How long the "hearing" will drag on and what Governor Talmadge will do about the commission when it is finally concluded are matters of conjecture.

Up to the present time the only defenders of the Georgia Public Service Commission to rush to its rescue have been the textile men, representing about $1,000,000 a month in electric purchasing power. How far their pleas will carry with Georgia's more or less eccentric Governor remains to be seen.

In the meantime, little evidence has been introduced to prove that the Georgia Public Service Commission has dealt unfairly or has been "in collusion" with the Georgia Power Company. Unless something more develops it is hard to see how the Governor can lop off the heads of the five members of his commission.

Ban Put on Birmingham Preferred

Further sale of preferred stock by the Birmingham Electric Company has been suspended by the Alabama Public Service Commission, pending conclusion of the present rate inquiry (ELECTRICAL WORLD, June 10, page 745, and June 24, page 816). Records of the commission show that the company has been authorized to issue 20,000 shares of $6 preferred stock, of which 4,000 shares are unissued or in the company's treasury, and 60,000 shares of $7 preferred stock, of which 12,000 are unissued or in the treasury. The utility was given fifteen days to apply for a revocation or modification of the order.

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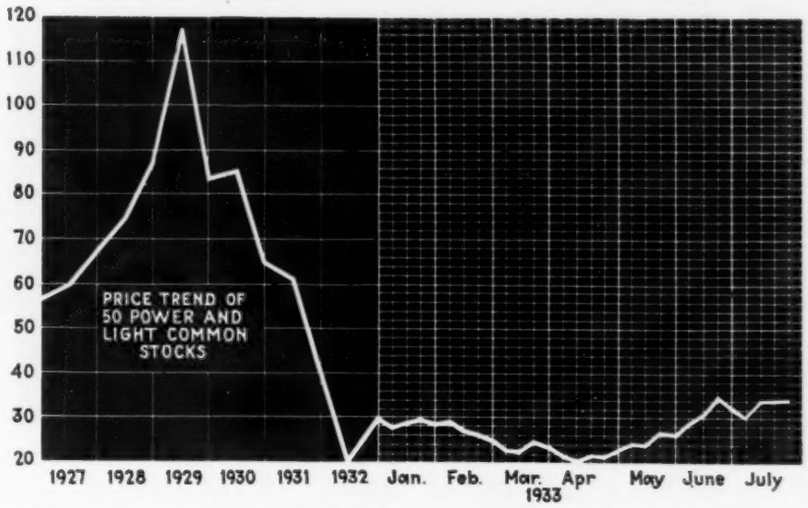
Central Public Service Stock Transfer

Conversion of Central Public Service Company preferred stock into preferred stock in Portland Electric Power Company in accordance with arrangements effected early this year by Franklin T. Griffith, president of the Portland company (ELECTRICAL WORLD, January 21, page 84, and February 11, page 180), was about 99 per cent completed on July 15. One hundred and fifty-five thousand shares of Central Public Service out of the 157,000 held locally had been transferred for approximately 90,000 shares of Portland Electric Power, having a par value of $9,000,000.

Utility Stocks Retain Gains



While utility issues retained their recent gains, price changes during the past week were insignificant. "Electrical World" index advanced slightly from 34.1 for the preceding week to 34.4.

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Debenture Deposit Time Extended

Protective committee for National Public Service Corporation 5 per cent secured debentures has sent a letter to debenture holders stating that as of June 15 an amount substantially less than $16,000,000 of these debentures has been deposited, and that as the committee does not propose to proceed with its plan unless that amount or 80 per cent of outstanding debentures were deposited, it will continue to receive deposits until August 1 next.

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Current Earnings Reports of Electric Light and Power Companies

Operating Companies

	1933	1932	Per Cent Increase	Operating Ratio 1933	Operating Ratio 1932
Alabama Power (Year ended May 31)					
Gross earnings	$15,161,694	$17,021,585	—10.9	48	50
Net earnings	7,833,731	8,594,258	— 8.8	..	..
Net balance	849,614	1,681,074	—49.4	..	..
Consolidated Gas Electric Light & Power of Baltimore (Year ended May 31)					
Gross earnings	11,813,682	12,252,793	— 3.6	69	66
Net earnings	3,649,573	4,128,758	—11.6	..	..
Net balance	1,982,265	2,581,147	—23.2	..	..
Consumers Power (Year ended May 31)					
Gross earnings	26,270,843	29,924,576	—12.2	54	50
Net earnings	12,100,830	14,885,729	—18.7	..	..
Net balance	3,326,440	6,502,128	—48.7	..	..
Duquesne Light (Year ended April 30)					
Gross earnings	24,108,533	26,984,094	—10.7	43	42
Net earnings	13,614,859	15,606,260	—12.7	..	..
Net balance*	11,091,630	13,368,748	—17.1	..	..
Georgia Power (Year ended May 31)					
Gross earnings	21,767,332	24,067,440	— 9.6	48	52
Net earnings	11,297,383	11,638,590	— 2.9	..	..
Net balance	2,167,454	2,657,354	—18.4	..	..
Kansas City Power & Light (Year ended May 31)					
Gross earnings	14,443,337	14,661,866	— 1.5	58	58
Net earnings	6,061,994	6,252,750	— 3.0	..	..
Net balance*	3,536,060	4,311,452	—17.9	..	..
Northern States Power (Year ended April 30)					
Gross earnings	31,438,086	33,826,931	— 7.1	60	57
Net earnings	12,446,775	14,646,288	—15.0	..	..
Net balance*	6,564,658	8,857,215	—25.9	..	..
Ohio Edison (Year ended May 31)					
Gross earnings	14,537,717	17,005,130	—14.5	49	45
Net earnings	7,449,841	9,285,711	—19.8	..	..
Net balance	1,736,680	3,798,233	—54.2	..	..
Puget Sound Power & Light (Year ended May 31)					
Gross earnings	12,804,408	14,918,959	—14.1	61	61
Net earnings	4,974,102	5,789,531	—14.1	..	..
Net balance	248,508†	751,373	—133.1	..	..
Tennessee Electric Power (Year ended May 31)					
Gross earnings	11,190,191	13,051,555	—14.3	58	58
Net earnings	4,718,468	5,481,902	—13.9	..	..
Net balance	502,634	1,439,643	—65.5	..	..
Virginia Electric & Power (Year ended May 31)					
Gross earnings	14,793,515	16,452,147	—10.0	64	66
Net earnings	5,317,191	5,625,381	— 5.5	..	..
Net balance	2,242,159	2,605,343	—14.0	..	..

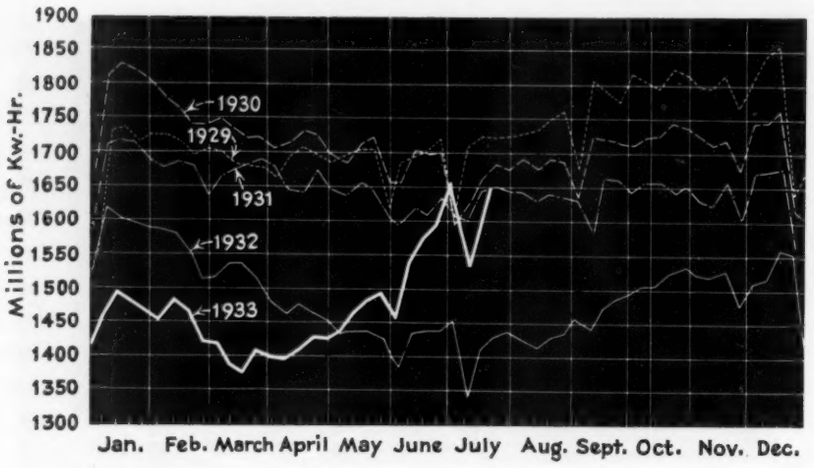
Holding Companies

	1933	1932	Per Cent Increase	Operating Ratio 1933	Operating Ratio 1932
American Water Works & Electric and subsidiaries (Year ended May 31)					
Gross earnings	$41,925,767	$47,554,252	—11.8	56	55
Net balance	1,706,855	4,462,032	—61.5	..	..
Commonwealth & Southern and subsidiaries (Year ended May 31)					
Gross earnings	108,724,505	124,366,522	—12.6	55	53
Net balance	340,257	10,255,464	—96.9	..	..
Engineers Public Service and constituent companies (Year ended May 31)					
Gross earnings	43,825,930	50,204,475	—12.7	63	63
Net balance	839,335	3,376,017	—75.0	..	..
Philadelphia Company and subsidiaries (Year ended April 30)					
Gross earnings	46,215,819	54,355,799	—14.9	65	62
Net balance*	7,389,942	12,030,937	—38.5	..	..
Public Service Corporation of New Jersey and subsidiaries (Year ended May 31)					
Gross earnings	119,736,757	134,323,123	—10.8	66	66
Net balance*	26,768,194	30,393,511	—11.9	..	..

*Available for all dividends. †Deficit.

Gross earnings—(Operating Companies) Gross operating revenue. (Holding Companies) Gross operating revenue plus other income. Net earnings—Earnings after deduction from gross earnings of operating expenses taken to include taxes, depreciation, maintenance, operating, etc. Net balance—Balance available from income for common stock dividends.

Output Approaches July Record



Following the short working week including Independence Day, the week ended July 15 brought a rise in central-station energy output to 1,648,339,000 kw.-hr., the Edison Electric Institute announces. This increases the lead over 1932 to 16.4 per cent, slightly exceeds the output over the week ended July 18, 1931, misses that of the week of July 19, 1930, by 1.1 per cent, of July 13, 1929, by 3.7 per cent and of July 20, 1929 (July record), by 4.6 per cent.

Every section of the country shows an excess over last year, ranging from 26 per cent for New England and the South to 5.3 per cent on the Pacific Coast.

Weekly Output, Millions of Kw.-Hr.

Week ended	1933	1932	1931	1930
July 15	1,648	1,416	1,645	1,667
July 8	1,539	1,342	1,604	1,626
July 1	1,656	1,457	*1,607	*1,594
June 24	1,598	1,441	1,635	1,704
June 17	1,578	1,442	1,610	1,698

*Includes July 4 holiday

Per Cent Change from Previous Year

Region	Week Ended July 15	July 8	July 1
New England	+26.0	+22.2	+20.9
Middle Atlantic	+12.2	+11.3	+11.1
Central industrial	+19.2	+16.2	+17.6
Southern States	+25.8	+29.1	+17.1
Pacific Coast	+ 5.3	+ 0.2	— 0.3
United States	+16.4	+14.7	+13.7

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Frigidaire Launches Intensive Summer Campaign

An intensive summer business campaign has been devised by Frigidaire Corporation, refrigeration and air conditioning subsidiary of General Motors. This was launched nationally July 5 when 15,000 Frigidaire dealers and salesmen began a selling activity that it is felt certain will prove July and August to be two of the best selling periods of the year.

Eight crews of Frigidaire factory and regional executives left Dayton July 5 and are holding conventions in district headquarters cities throughout the nation. District managers, sales managers, dealers, field supervisors and department store executives and dealer supervisors are participating in the conventions, which are one-day affairs, during which household and commercial refrigeration, beer cooling and air conditioning for both comfort and commercial fields are being discussed.

The selling drive was scheduled for July 15 with large space-advertising copy breaking in more than 500 daily newspapers, a coast-to-coast radio program and the distribution of 5,000,000 four-page rotogravure tabloids carrying the story of Frigidaire's features and economies.

In announcing the convention meetings at a preview of the program in Dayton last week for the benefit of distributors and branch managers H. W. Newell, vice-president in charge of sales, said:

"The exceptional improvement in business generally and in Frigidaire business in particular since early March, when the bank holiday ended and Frigidaire opened its 1933 campaign, has proved that sales volume is there for dealers and salesmen who go after it. Frigidaire is confident that the extraordinary buying of its products in this period has been merely the beginning of the improvement that will be shown in the remaining months of this year.

"Frigidaire's sales of household refrigerators in June were 48 per cent greater than for June of 1932. The dammed up desires of millions of persons have been released, with the result there has been an unprecedented demand for products of all kinds, but particularly for electric refrigerators and automobiles. We are launching immediately one of the largest summer period campaigns we have ever had. We believe the efforts of our 15,000 dealers and salesmen will vindicate our judgment in increasing our factory personnel to a point nearly equal to that of the boom days of 1929, and we believe the extra income that will come to dealers and salesmen during this heavy summer selling drive will be very welcome."

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Electric Appliances Produced in Canada

The electric household flatiron, one of the first electrical appliances to enter the home, continues to hold a leading position in the number produced in Canada. Figures for 1931 show that 138,145 electric irons valued at $260,200 comprised the Canadian output that year. In numbers, vacuum cleaners came next, with 107,682, valued at $3,378,123. The record for the period shows:

	Number	Selling Value at Works
Electric clocks	68,371	$ 225,161
Air and space heaters	23,003	166,780
Toasters	75,793	163,165
Percolators	3,886	39,491
Flatirons	138,045	260,200
Washing machines, electric	59,693	6,510,378
Vacuum cleaners and attachments	107,682	3,378,123
Electric water heaters	13,311	114,227
A.C. receiving sets only	274,362	16,800,037
A.C. comb. phono. and radio	12,420	1,490,405
Battery operated radio sets	4,247	236,508
Lamps, incandescent, standard	18,205,931	4,044,243
Lamps, incandescent, miniature	7,255,194	685,015
Radio tubes	3,297,007	2,298,098

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Kelvinator Increases Salaries

Employees of Kelvinator Corporation have been given an increase in compensation averaging 10 per cent, effective July 1. All factory employees and those on salary as well are affected, both in the United States and leading cities in other countries of the World. "This move is being made," President G. W. Mason stated, "because we believe with the Administration that increased buying power is a necessary factor in the furtherance of business recovery."

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Woolworth Installs Air Conditioning

F. W. Woolworth Company has installed air conditioning in its Chicago State Street store. A 300-hp. motor drives a 285-ton centrifugal compressor which provides the necessary refrigeration. A 40-hp. pump circulates the water for cooling and washing the air. Approximately 100 hp. in supply and exhaust fans insures an adequate supply of cool, clean air at all times and under all conditions. The installation has a total load of 328 kw.

Selling Problems to Feature Lighting Sales Conference

Aggressive methods of selling electrical illumination and an address by George E. Whitwell, chairman sales committee Edison Electric Institute, will feature the program of the annual Lighting Service Conference to be held on August 28 immediately preceding the I.E.S. convention at the Lake Lawn Hotel, Lake Delavan, Wis. At the opening session at 2 p.m. Mr. Whitwell will speak on "An Industry Stimulates the Sale of Lighting," followed by G. K. Hardacre, Public Service Company of Northern Illinois, on "Profits from Outdoor Lighting"; M. W. Ross, Commonwealth Edison Company, Chicago, on "Customer Service Maintains Load," and Karl Staley, General Electric Company, on "Commercial Value of Field Equipment Tests." At 8 o'clock a home lighting session will be held, with the following addresses: "Forgotten Kilowatts," D. W. Atwater, Westinghouse Lamp Company; "Selling through Demonstration Homes," J. S. Hogan, Northern States Power Company, and "Proved—Women Want and Buy Better Lighting," E. W. Commery and Mary E. Webber, General Electric Company.

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Business Council Committees

Titles and tentative personnel of the various committees and subcommittees created as a result of the formation of the Business and Advisory and Planning Council for the Department of Commerce have recently been announced. Among the electrical men selected in addition to Gerard Swope, permanent chairman (ELECTRICAL WORLD, June 24, page 810), are Henry I. Harriman, who in addition to serving on the executive committee will be a member of the committee on general economic research; Walter S. Gifford, who has been named chairman of the committee on statistical reporting and uniform accounting for industry, and Edward N. Hurley, who has been made chairman of the subcommittee on the foreign service of the department. Mr. Swope, permanent chairman of the council and of its executive committee, is also permanent chairman of the committee on general economic research.

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New Multi-Section Aluminum Train Ordered

An order for electric equipment for the Brooklyn-Manhattan Transit Company's new multi-section aluminum train has been received by the Westinghouse Electric & Manufacturing Company subject to the approval of the Transit Commission of the city of New York.

This new type of rapid transit train, which can be used on either the elevated or subway lines, will revolutionize the mode of mass transportation in large cities, and all of the research and engineering resources of the Aluminum Company of America, the Pullman Company, as well as the Westinghouse organization, have been called upon to make this new train the outstanding achievement of the transportation world. There will be five cars in this new type of train. In appearance it will be very striking and its performance will create new standards for subway and elevated transportation. It will have a seating capacity for 190 passengers and standing capacity for an additional 498 riders. The entire train, it is estimated, will weigh less than 140,000 lb. light and less than 240,000 lb. loaded. It is expected to be delivered and in operation on the B.M.T. Lines in Brooklyn early this winter.

The train will be driven by 12 60-hp., high-speed, spring-supported, electric motors. This application is their first to rapid transit (subway and elevated lines) service. Each motor is solidly mounted on trucks connected to gear units through a double, flexible coupling. A new multi-notch accelerator type of control will also have its first commercial application on the new train. By means of this new control the operator initiates the acceleration which is then automatically controlled with a degree of smoothness never before accomplished in rapid transit operation. Three control units will be mounted in a five-car train, each unit controlling four motors.

The rate of acceleration for the train will be 4 m.p.h. each second. The high-speed motors of the train will result in a balancing speed of 50 m.p.h. on level tangent track at full normal voltage.

Major New Construction This Week

Transformers and power substation accessories, machine drives, motors and controls, electric refrigeration and pumping machinery and other electrical equipment will be purchased by Hiram Walker & Sons, Inc., Detroit, Mich., recently organized subsidiary of Hiram Walker-Gooderham & Worts, Ltd., Walkerville, Ont., for new multi-unit distillery on 15-acre site at Peoria, Ill. A $1,000,000 project.

Hayward, Calif., is arranging fund of $240,000 for city-owned electric light and power plant and distributing system.

Central Breweries, Inc., East St. Louis, Ill., has authorized extensions and improvements. Cost over $200,000, with equipment.

Heavy-duty motors and controls, electric-hoisting, conveying, loading and other handling equipment, power transformers and accessories will be installed in new river-rail terminal in vicinity of Beaver, Pa., by Pittsburgh Coal Company, Pittsburgh, Pa. Cost about $1,000,000, with tipples and other structures.

American Brewing Company, Dayton, Ohio, organized recently by George T. Matthews, Winters Bank Building, and associates, plans 150,000-bbl.-per-year plant on 12-acre site purchased including power house and refrigerating plant. Cost over $500,000.

Clearwater, Fla., plans city-owned electric light and power plant and is arranging fund of $125,000.

Electric hoisting, conveying and loading equipment, heavy-duty motors and controls, etc., will be purchased for new loading tipple at Catlettsburg, Ky., of Northeast Kentucky Tipple Company, Ashland, Ky. Federal permission asked. Cost over $150,000.

Old Mission Brewing Company, Los Angeles, Calif., plans plant at Culver City, Calif. Cost about $150,000, with equipment.

Fund of $448,000 is being arranged by Newcastle, Ind., for extensions and improvements in city-owned electric light and power plant, including new equipment.

Machine drives, motors and controls, panelboards, conveyors and other equipment will be installed in addition to acetate rayon mill at Rome, Ga., of Tubize Chatillon Corporation, New York. Cost over $500,000.

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Delinquent Electrical Accounts

(National Electrical Credit Association)

Number of Accounts Reported

Division	June 1932	June 1933	Per Cent Inc. or Dec.	Six Months 1932	Six Months 1933	Per Cent Inc. or Dec.
New York	272	154	—43.4	1,459	1,000	—31.5
Middle and Southern Atlantic	90	30	—66.7	652	349	—46.5
New England	78	60	—23.1	652	391	—40.0
Central	417	230	—44.8	2,991	1,708	—42.9
Total	857	474	—44.7	5,754	3,448	—40.1

Total Amounts Reported

New York	$20,927	$10,405	—50.2	$143,224	$67,198	—53.1
Middle and Southern Atlantic	9,951	2,126	—78.6	63,290	19,865	—68.6
New England	4,527	3,249	—28.2	47,854	23,887	—50.1
Central	26,751	15,631	—41.6	225,201	102,263	—64.8
Total	$62,156	$31,411	—49.5	$480,569	$213,213	—55.6

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New York Metal Prices

	July 11, 1933 Cents per Pound	July 18, 1933 Cents per Pound
Copper, electrolytic	9.00	9.00
Lead, Am. S. & R. price	4.50	4.50
Antimony	6.75	7.50
Nickel ingot	35.00	35.00
Zinc, spot	5.20	5.35
Tin, Straits	47.00	46.75
Aluminum, 99 per cent	23.30	23.30

As to Rates——

• Reduction in the rates of the Long Island Lighting Company and the Nassau & Suffolk Lighting Company, amounting to approximately 8 per cent and effective August 1, was approved last week by the New York Public Service Commission. The new rate for residential service will be $1 per meter per month plus energy charges of 5½ cents per kilowatt-hour for the first 50 kw.-hr., 5 cents per kilowatt-hour for the next 150 and 3 cents per kilowatt-hour in excess of that amount. The present residential rate is $1 per meter per month plus energy charges of 6 cents per kilowatt-hour for the first 100 kw.-hr. and 5 cents per kilowatt-hour in excess of that amount, with a provision that the total charge will not exceed a rate of 9 cents per kilowatt-hour unless the minimum applies. The new commercial rate will be a minimum charge of $1 for the first kilowatt or less of demand and 50 cents per kilowatt or fraction thereof for excess demand. Energy charges of 8½ cents per kilowatt-hour for the first 30 kw.-hr. per kilowatt of demand will apply; 7 cents per kilowatt-hour for the next 180 kw.-hr. per kilowatt of demand (but not more than 1,000 kw.-hr.) and 4 cents per kilowatt-hour for excess use.

• Compromise rate reduction by the Birmingham Electric Company, estimated to cut company revenues 27 per cent and save consumers $360,000 a year (ELECTRICAL WORLD, July 1, page 8) has been rejected by the Alabama Public Service Commission. The Birmingham city commission agreed to the reduction, but engineers representing the Alabama Rate Association and the public contended the proposal meant only a 13 per cent reduction to 88 per cent of the utility's customers. Engineers representing the various interests concerned are continuing their conference in an endeavor to reach an agreement satisfactory to the state utility board.

• Electric rate reductions of from 8 to 15 per cent, with no reductions in either gas or steam charges, are indicated in the valuation and appraisal of the Northern States Power Company properties in St. Paul, Minn., made to the City Council last week by Burns & McDonnell of Kansas City. The report states that should a municipal electric plant be constructed rates could be reduced 30 per cent.

• In a unanimous vote by the Youngstown City Council the electric light and power rate reductions offered by the Ohio Edison Company have been accepted. The Council at the same time authorized its utilities committee to continue negotiations toward an entirely new rate on a sliding scale which might be more favorable to consumers. The reduction accepted last week embraces a revision of the kilowatt-hour block schedule. The present 5.5-cent rate remains for the first 40 units. C. S. MacCalla, division manager of the Ohio Edison Company, told Council that the company's revenue had been cut by $295,000 a year because of various circumstances which have arisen in the last eighteen months. He enumerated $80,000 in rate cuts last October, $75,000 in the cuts accepted on the present occasion, $90,000 in federal utility tax and $50,000 in state tax, both paid by the company.

• The first public utility reply to the campaign by which Sherman Minton, public counselor for the Indiana Public Service Commission, hopes to force down utility rates in the state, has been made by the Public Service Company of Indiana. The utility's reply to a petition to require the utility to appear and show cause why its electric rates in the extensive "south system" should not be reduced was a motion asking the commission to dismiss the entire proceeding. The commission overruled the motion and announced the case would be heard. A significant point in the motion was the allegation that the public counselor has no legal authority for his original petition and that the Indiana Public Service Commission acted without legal support in citing the company to appear. "If the commission believes an investigation of rates and charges should be made," the motion states, "it must proceed with such investigation in the manner and according to the procedure provided for in and by the law of the State of Indiana."

• Rate cuts offered by B. W. Marr, president of the Columbus Railway, Power & Light Company (ELECTRICAL WORLD, July 15, page 72) have been unanimously rejected as too small by City Council, which moved to launch a fight to the finish for a larger reduction in electricity rates which still will leave the Rail-Light Company a fair profit.

• Three companies were ordered last week by the Illinois Commerce Commission to reduce electric rates. The decreases will range from 14 to 18 per cent and the groups affected are Peoples Power Company, McHenry Light & Power Company and Western United Gas & Electric Company (northern division). Officials of Peoples Power notified the commission that they would not oppose the decreases recommended by that body last month and accordingly the reductions were ordered entered at once. The estimated residential saving was placed at 14 per cent, including the 3 per cent federal tax, which the company thus assumes at once. The commercial saving is estimated at 18 per cent and that on industrial use of electricity 17 per cent. The total annual reduction is placed at $204,000.

Municipal Items

FLORENCE, ALA., voted 919 to 63 in favor of a municipal plant.

EVANSVILLE, IND.—By a vote of nine to three, the City Council at its last meeting passed a resolution favoring municipal ownership of gas and electric plants serving the city. It is said the first step will be to ascertain whether funds can be secured from the Reconstruction Finance Corporation. The resolution requests Evansville papers to conduct a straw vote on the question, but the poll will not be requested until the special committee determines definitely that the city can go through with the project.

STARKVILLE, MISS., signed contracts with A. L. Hogan of New Orleans for the construction of a municipal plant.

CARUTHERSVILLE, MO., starts a movement for a federal aid municipal plant through the appointment of a committee by the Council.

FREDERICKTOWN, MO.—The city is contemplating filing an application for a loan under the national industrial recovery act to finance the construction of a municipal light and power plant and distribution system estimated to cost $100,000. The W. A. Fuller Company, St. Louis, Mo., is the consulting engineer in charge of the plans.

NEBRASKA—Signatures have been obtained to create a power district for Gage County and to invest $500,000 in a distribution system. The plan includes purchase of power from the Iowa-Nebraska Light & Power Company and obtaining funds from the federal government.

Projects to utilize the Platte River in Nebraska for federal aid power districts are jeopardized by Colorado and Wyoming serving notice that they will not permit diversion of the waters of the Platte River. Add to this jealousy between promoters and communities over the projects contemplated which aggregate six times present power requirements of the entire state.

Public Works Department of Nebraska has approved the $1,250,000 Middle Loup Power and Irrigation District and given authority to apply for federal funds.

CENTRAL CITY, NEB.—The city is contemplating the construction of a municipal light and power plant to cost approximately $75,000, including building, equipment, distribution lines, etc. The city now has $40,000 available for this purpose and may apply for additional funds under the national industrial recovery act.

BETHLEHEM, PA.—Ruling that City Council had exceeded its authority in entering into contracts for the construction of a municipal power plant, Judge Stewart of the Northampton County

Court handed down an opinion last week restraining the city from proceeding with the work and making permanent the injunction asked for by three taxpayers of the city. Work on the plant has already been started, some of the poles having been set up and the work on the building being under way.

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Wrigley Building Floodlighted Ten Times Former Intensity

For years a gleaming white landmark on Chicago's lake front, the Wrigley Building now shines forth at night as a ten times brighter example of the power of the nickel package of chewing gum. The floodlighting intensity on its white terra-cotta walls formerly was graded from 15 foot-candles at the top of the building to about 2 at the third floor. The intensity now ranges from 130 down to 3 foot-candles.

There are two reasons for the increase in the Wrigley Building's floodlighting load: The first is the owner's firm belief in advertising to capitalize on the return of more prosperous days; the second is a desire to help Chicago put its best foot forward during A Century of Progress Exposition. With respect to the former, it should be said that the $50,000 cost of the added equipment is not the sole measure of the owner's confidence in the publicity value of floodlighting. Before the new projectors were installed the annual floodlighting cost was $18,000, covering current, maintenance and lamp replacement. It is estimated that full operation of the present equipment will increase the yearly expense to almost $30,000. Incidentally, many projectors used in the floodlighting, with the exception of the equipment just installed, are eight years old. During that time it has not been necessary to replace a single cover glass or reflector.

The original floodlighting load was 190 kw. It is now 377 kw., an increase of nearly 100 per cent. Changes were made in both the number and size of projectors in all four of the batteries which illuminate the building.

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French Automatic Telephones

As a result of the opening of its 25th dial telephone exchange, Invalides, the telephone system of Paris is now 74 per cent automatic, and the French capital is a leader among the great cities of the world in modernizing its telephone system. Companies in the International Telephone & Telegraph Corporation group in Europe have supplied the French government with a large part of the equipment for converting Paris and several of the other large cities of France to automatic operation.

Lighted House Plants Offer Profitable New Field

A profitable new field for central stations, contractors and electrical dealers in the lighting of house plants is seen as a result of tests recently concluded by Lawrence C. Porter and G. F. Prideaux of the Nela Park Engineering Department of General Electric Company at Cleveland, Ohio.

Exhaustive recent experiments prove that when localized lighting is applied to the plant its night-time appearance is greatly enhanced and its indoor life is lengthened. These experiments confirm results of tests conducted by various universities, commercial greenhouses, the Boyce Thompson Institute for Plant Research, the U. S. Department of Agriculture and others in connection with the stimulation of both flowering plants and vegetables, by means of artificial light.

Mr. Porter and Mr. Prideaux have been experimenting for more than a year with ways and means of adding lamps to common types of house plants so that they can be used in locations other than beside windows. The present condition of the plants indicates that with such supplementary lighting they can be kept at desirable places which might be at a considerable distance from the windows.

Measurements of illumination on the tops of the plants show a wide range of beneficial intensities. On the standard holding five flower pots the intensity varies from 150 to 300 foot-candles. The lighting unit in this case is a 60-watt lamp equipped with an aluminum reflector and covered by a parchment shade for appearance.

Temperature measurements made at approximately the points where the foot-candle measurements were taken showed relatively small increases over room temperatures, in the neighborhood of 2-8 deg. It is felt that such small increases would not be injurious to the plants.

In general, it has been found that it is better to have the lighting, when used regularly, come from above the plants; otherwise, they have a tendency to bend over toward the light source, in some cases touching it and being burned. It is felt that this line of work opens up an opportunity to florists and designers of plant-holding equipment to incorporate lighting devices with their equipment, thus creating a new sales angle.

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Western Massachusetts Plan Berkshire Tie

Within a short time construction is expected to begin on a 110-kv. single-circuit transmission tie line about 8.5 miles long from the New England Power Company's circuits at Lanesboro, Mass., to the Pittsfield station of the Pittsfield Electric Company, affiliated with the Western Massachusetts Companies. The plans are being prepared by the engineering department of the Western companies group at Springfield under J. P. McKearin, electrical engineer. A wooden pole line with two ground wires is contemplated, with the necessary switching and control equipment at tie terminals. The estimated cost is $150,000.

Completion of this tie will provide an alternative source of high-tension energy for the city of Pittsfield and its vicinity in case of trouble on the existing double-circuit 110-kv. line running thence from the Cabot hydro-electric plant of the Turners Falls Power & Electric Company on the Connecticut River near Greenfield. A major interconnection with the New England Power Company already exists at Cabot station. The new tie line will complete a loop covering the central Connecticut Valley and Berkshire districts and increase the facility of interchange between the Connecticut Power Exchange, New England Power and the New York Power & Light systems.

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Oklahoma Electricity Tax Passes

The 1 per cent general sales tax law which became effective in Oklahoma July 8 and applies to "all tangible goods, wares and merchandise sold at retail" in the state also levies the 1 per cent tax on all sales of electricity to domestic or industrial consumers. Telephone, telegraph and radio broadcasting services also come within the provisions of the bill.

EDITORIALS

L. W. W. MORROW
Editor

NIRA will not sell

THE Administration fully realizes that the present upturn in business cannot be sustained unless purchasing power is increased. This is the chief object of NIRA now and has resulted in a veiled threat of governmental action because business has been seemingly reluctant to shorten hours and raise wages without a corresponding increase in prices. It is indeed difficult to reconcile the Administration's efforts to hold down prices and yet increase expenses.

For three years sales prices have been low and the market thin for electrical manufacturers. None of them made profits from production and sales and marginal or high cost producers either closed down or suffered enormous losses. Even now there is only a slight upturn in the capital goods industries—not sufficient to give nominal profits. Is it any wonder, therefore, that some hesitation is shown in embarking upon a program for increased payrolls? There is no money for benevolence; in fact, it is to the credit of the electrical manufacturers that they leaned over backward in attempts to sustain employment during the depression, and this is a chief reason for red ink balance sheets. In dealing with capital goods industries NIRA must consider facts and not theory. They are in no condition to take a bet or to donate money. Electrical manufacturers can be counted upon to be among the first to share prosperity with their employees. They are in hearty sympathy with the aims of the administration to increase employment and purchasing power. But to act they require two things —(1) a market volume in purchases and, (2) a price increase that will sustain the increased labor cost. The increased market does not yet justify increased costs, so there is a very practical difficulty in adopting the NIRA program. Increased price goes with increased cost under present conditions and this will benefit labor and increase employment—the objectives of NIRA.

Shortsighted condemnation policies

PRIVATELY owned light and power companies have built their systems to serve a region. Their structures and rates have been built upon the premise that farms, villages and cities should be served and the commissions have encouraged this type of development because it is in the public interest.

Now comes a counter-trend. Several cities demand a valuation of their distribution system with the desire to buy it from the utility and then purchase energy at wholesale from the utility for local distribution. There is encouragement to this idea in the belief that the government will lend the municipality money to buy the distribution system.

What is the effect of such a policy? In the first place it puts a handicap on service to rural and village customers, for the regional rates are based upon these city systems carrying their share of the total cost of regional utility development. They return the gross earnings that make the enterprise a success and their value is far greater than that obtained by appraising the physical property used in their local distribution system. This disintegration of a regional utility system places an added burden on the remaining customers of the utility, affects its stockholders and affects its possibilities for building electric service in the territory.

This sharpshooting by municipalities at the lucrative service areas of utility properties is not

in the public interest and, if continued, will seriously jeopardize American electrification. Such a practice tears down what has been built. It adds nothing to employment or industrial recovery. It is to be hoped that both state commissions and the national administration will discourage these shortsighted attempts of municipalities.

Gaseous lighting wins at Chicago Fair

DARING modernistic architecture vies with electricity for recognition as the dominant characteristic of the Century of Progress Exposition. Rising to major prominence among the electrical attributes is the spectacular use of gaseous tube lighting. It is everywhere, on the building façades, on street standards, in the interiors and in the advertising displays. Thousands of feet (40,000 by one producer alone) of this tubing have been used to accentuate the architectural contours, give a sensitive touch to garish paint and, on the whole, lend a majestic and æsthetic tone to the ensemble effect.

In the careful and well-planned execution of this task gaseous tubing has forged its way out of the mere realm of commercial display and attached to itself as never before the capacity to be effective, artistic, temperamental and ornamental in areas where incandescent lighting would have entailed annoying excrescences. Well may it prove to be the emancipation of tube lighting from advertising and its large-scale adoption as a definite adjunct of architecture, interior decoration, space lighting and wall delineation. The architect and decorator will unmistakably see there the opportunity to effect contrasts, accentuate outlines and employ soft brilliance to command æsthetic attention. In so far as they respond to the surpassing display will they see the potentiality of gas-tube lighting as a companion to floodlighting for exteriors, strip lighting for interiors and interior color-screen lighting for subdued radiance.

This is the portent of the effective and extensive use of this form of illumination on the façades and portals of the Hall of Science, the Electrical Building, the General Exhibits Building, Federal Building and Social Science Hall, as well as the Grand Staircase in the Electrical Building and the Great Hall in the Science Building.

The lesson of Durham and Poughkeepsie

IN DURHAM, N. C., ten years or more ago, a power company man conceived the bright idea of equipping new homes completely with electrical appliances—wiring, ranges, water heaters, refrigerators and the rest—financed under one contract. It was an experiment, but some twenty-five or fifty installations were sold. The number doesn't matter, but it was enough to prove it could be done.

Again, in the last three years, the Central Hudson Gas & Electric Company has sold more than 150 "full-use electric homes," as it calls them, in which the customer buys a complete equipment and pays for appliances, interest and current in one monthly charge over a period of five years. Here is another experiment with the same idea, this time organized on a larger scale, and again successful. It proves that if a power company wants to sell large installations that bring in a maximum revenue from the customer it can be done.

There are two ways to build residence load in any territory. You can organize around an appliance and sell it to the largest possible number of consumers. Or you can organize around the home as a unit and sell into that home the greatest possible number of appliances. Both ways are good. Both ways should be used. But it has been a tradition in the electrical industry that the only way to sell is to get excited over one appliance at a time and sell it by the campaign method. Because that has become the customary procedure, few utility and manufacturing companies ever consider that there is anything else that can be done.

But in the last analysis, the power company is dedicated to public service. That means service to people, and people live in homes. And the logical approach to such a service would seem to be to study what service it is that people need from electricity in their homes. And there you are. Complete service can only be rendered through complete equipment. And the old process of selling one thing at a time is merely picking at the job, not doing it. It is amazing that the example of Durham and the experience of Poughkeepsie have aroused so little comment in the industry, for it has a profound significance for its future.

High-Capacity, Low-Cost Distribution in New Chicago Post Office

By C. A. CARPENTER

Electrical Engineer Graham, Anderson, Probst & White, Chicago, Ill.

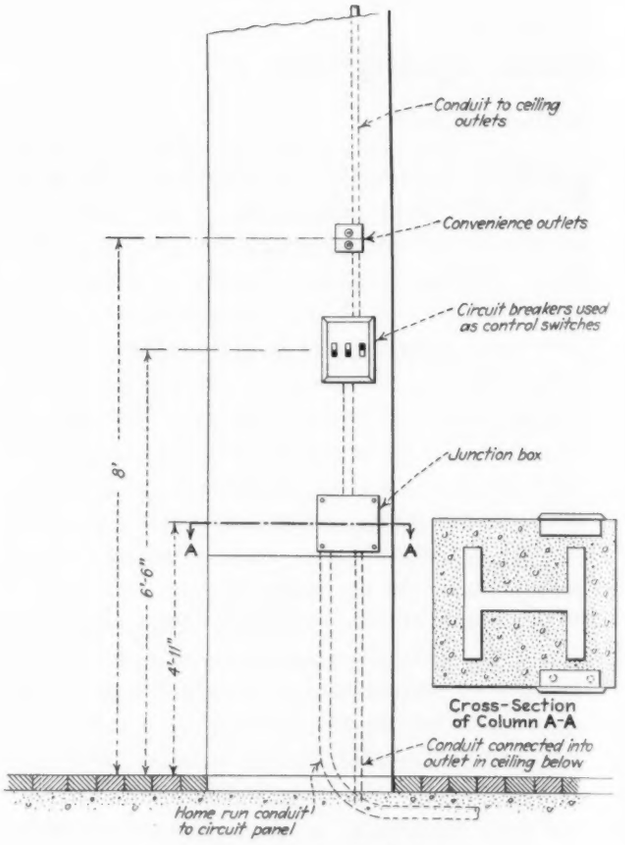
ULTIMATE annual electricity consumption of the new Chicago Post Office is estimated at approximately 35,000,000 kw.-hr. The Treasury Department at Washington was quite startled by this figure and stated that the present total use of all the 1,400 buildings in its control is only 38,000,000 kw.-hr. per year. With its 280,000 sq.ft. of plan and its 56,000,000 cu.ft. of bulk over a large area of railroad trackage, this building is one of the largest "air rights" structures ever erected. The mail-handling conveyor system uses 813 motors, totaling 2,300 hp. There are 48 passenger and mail elevators, aggregating 3,535 hp., and 128 fans that add up to 1,821 hp. These, with miscellaneous power uses of more than 1,000 hp., combine into an estimated power demand of 4,200 kva. Plus lighting that may at times run up to 4,000 kva. the total demand of the building is set at the final figure of 8,200 kva.

The features of size indicated by these figures would be in themselves sufficient to attract more than passing notice to the new post office in Chicago even though, as is the case, the provisions of service facilities were in the main simply a straightforward engineering job containing few departures from recognized practice. Some of these departures are quite significant, however, and should be recorded. They occur in the wiring for lighting and small power.

Owing to the comparatively large area served by each of the lighting panels in the post office work spaces an abnormal number of circuits would have been required if the circuit load had been limited to the conventional 1,000 watts per side. With the scheme that was adopted each of the typical branches (which are three-wire) has a present load of 4,400 watts; i.e., twelve 200-watt ceiling outlets and two 1,000-watt receptacle outlets. The branches are not fused, but are equipped with circuit breakers, tapping off from the four-wire, three-phase cabinet bus. With the ordinary method the same load would require two 2,000-watt, three-wire circuits and one 1,000-watt, two-wire circuit; a total of eight branch wire connections on the panel, as against three with the adopted scheme, a reduction of 62 per cent.

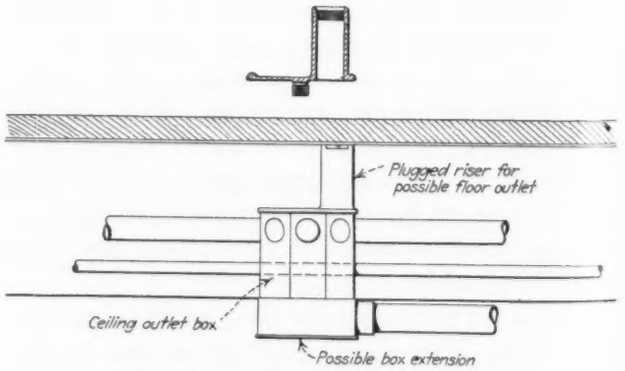
Increase in floor slab thickness avoided

Another point to be considered is that a reduction in number of home run conduits lessens the conduit congestion in the vicinity of the cutout cabinet. It was found that the floor slab would have had to be thickened in the area near the cabinet, as the mass of conduits converging



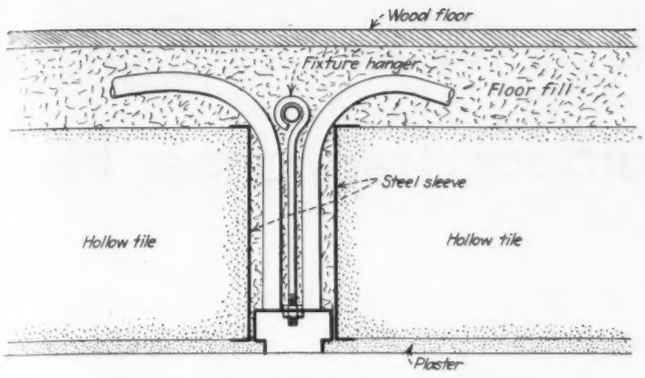
Sub-branch circuit design

Each three-wire branch from cabinets breaks into six sub-branches in paired junction boxes on columns.

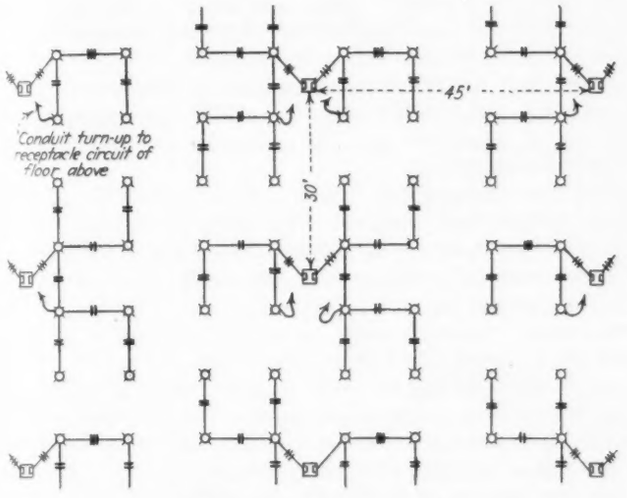


Floor taps from ceiling outlets

Each ceiling box has a plugged riser to the floor above. When a floor outlet is needed the wood floor is drilled through at the riser location. Or if outlet is desired at another place conduit is run from a ceiling box extension. Ceiling conduit system has riser to receptacle circuit of floor above as shown in diagram of sub-branch circuit design.



Steel sleeve obviates breaking hollow tile



Outlet control arrangement

Each lighting bay is roughly 45x30 ft. Ceiling outlets are set on approximately 10-ft. centers. To one circuit breaker box on each column is connected one group of eight outlets; to the one on the opposite side of the column, a four-outlet group. Half of the outlets in each group are controlled by a circuit breaker. Note that the lights in any bay can be controlled as follows: All on; the six at one end; two only at each end for minimum requirements; four only at each end. Although 200-watt lamps are now being used, the wiring from cutout cabinets is ample to feed 300-watt lamps with a branch circuit voltage drop not exceeding two volts.

at that point would have diminished the strength of the floor structure. However, the principal benefit derived from the scheme is the decrease in cabinet size. The cabinets are large now and it would have been out of the question to have boxes 2½ times as large, which would have been the alternative to a greater number of cabinets. In this building locations suitable for electrical cabinets were not easy to find and, further, each cabinet had to be provided with a protective barrier to keep passing trucks from ramming it, all of which involves additional expense and inconvenience. Thus, the added expense of circuit breakers on the panels was more than justified.

Proceeding outward from the lighting panels in general, a home run conduit with a three-wire subfeeder (two outside wires and the neutral) is run to one junction box on each column. Another junction box on the opposite side of the same column is connected to the first by conduit. The home run wires are No. 12, 10, 8, 6 or 4, depending on the distance between the cutout cabinet and the column at which the home run terminates. Wiring above the junction boxes is No. 12. The principal purpose of the junction box is to avoid the necessity for making a number of heavy wire splices in the circuit breaker boxes, where they would otherwise occur. Above each junction box is a three-gang circuit breaker box connected to the former by concealed conduit. The middle circuit breaker protects the receptacle outlet above and the wiring to future floor outlets, as will be explained later. The outer circuit breakers are provided for the control of ceiling outlets served from that column and are available to any one for operation. The middle circuit breaker can only be operated by persons holding a suitable key.

Ceiling circuits serve floor outlets above

For any enterprise, like a post office, employing considerable local lighting and small motors, it would be ideal to underlay the floor with a grid of wiring duct which could be tapped wherever required for equipment standing free of columns. However, such a scheme in this instance is impracticable for two reasons: First, the cost, which would have run to prohibitive figures; second, the floor slab thickness, which would have had to be increased, with consequent further expense if such a duct system were laid.

Solution of the problem involved utilizing the outlets on a ceiling to serve also as supply for floor outlets in the floor above. How this was done is shown herewith. The standard deep concrete box is fitted with a top with a special fitting having a neck or standpipe of such length that it will finish flush with the top of the floor slab. The top of the standpipe is closed with a flush flat plug. The location on the floor above of the center of the ceiling outlet can be accurately determined by measurement. The position of the standpipe relative to the center of the box can be seen if the fixture canopy is slid down (which will have to be done in any event). With these two items of information, it is possible to drill through the wood flooring and hit the standpipe plug. Having done so, it is easy to screw in an extension of any desired length and the outlet is ready for wiring.

Where a floor outlet is wanted at a location apart from a ceiling outlet below a hole is drilled through wood flooring and slab. Through this hole will be inserted the standpipe conduit, which will be screwed into a hub on the back of a box installed exposed on the ceiling. At the nearest ceiling outlet it is intended that an extension collar be fitted to the bottom of the box, as shown, and exposed conduit run therefrom to the new ceiling outlet previously described.

There is another detail of wiring in this building that is worthy of notice. It is not new, neither is it so well known as it should be. The floors of the north or office section are of hollow tile construction. Those who are familiar with ordinary wiring methods know the rather slipshod and unsatisfactory way of breaking through the tile arch to install outlets on the ceiling below. Such holes are frequently much larger than necessary, resulting in a material weakening of the strength of the floor. To avoid this, a sheet steel sleeve was installed at the location of each ceiling outlet and fastened to the form boards. The tile work was built around this in a neat and workmanlike manner and the outlet box and connecting conduits were then installed as shown. Incidentally, the diagram shows the method of installing the hanger which carries the weight of the fixture.

Selects Water for Fighting Outdoor Transformer Fires

ALTHOUGH water has been widely discredited for fighting oil fires, it has been found to be the most satisfactory and economical means for extinguishing external fires which may occur in conjunction with outdoor conservator-type or "inertaire" transformers such as installed at the Safe Harbor Water Power Corporation hydro-electric plant. At least this is the conclusion of G. S. Diehl, assistant to the superintendent of operations Pennsylvania Water & Power Company, and W. T. Crook, Jr., testing engineer Safe Harbor Water Power Corporation, who report* extensive tests on the subject. The water must be supplied in ample quantity as a spray and provision made so that pools of oil will not accumulate in the pit under the transformer. However, they admit that CO_2 is ideal for internal fires and that certain chemicals are as reliable as water for external fires.

The Safe Harbor installation, for which effective fire-fighting procedure had to be developed, involves six 28,000/42,000-kva., 13.8/230-kv. oil-insulated, single-phase transformers of the conservator type with nitrogen gas cushions and two 30,000/45,000-kva., 13.8/66-kv., three-phase "inertaire" transformers, all with forced air ventilation for the higher rating. The units are installed along the upstream wall of the power house on 40-ft. centers and separated by concrete walls 40 ft. high. The floor under each unit is divided into three basins, each having a 12-in. drain.

Mounted on the walls of each transformer pocket are six nozzles which will spray water over the tops and sides of the units when the header to which they are joined is connected to the station-service water supply by a flexible hose equipped with a quick-connecting coupling. The hose connection is made on the opposite side of the fire-wall from the transformers so station attendants do not have to approach a burning transformer. With an extra hose connection they are free to extinguish any ground fire that may occur under the transformers. Of course the transformers would be de-energized before the water is turned on.

The only fires that are considered probable with these units are those which would involve the bushings or conservator tank or would be caused by a ruptured transformer tank or top.

In the tests made to simulate such fires an old 10,000-kva. transformer tank provided with a false top of the same dimensions as the 230-kva. units was supported on cinder-covered cribbing in a three-sided pocket of the same dimensions and height as at Safe Harbor. The tank was filled with water on which was floated a 12-in. layer of transil oil. After heating this oil with a steam coil to 120-160 deg. C. it was ignited with a flaming oil rag carried on a messenger wire. The oil was allowed to burn from six to twenty minutes and then forced to spill out of openings in the tank cover by forcing water into the bottom of the tank. By spilling an average of 150 gal. of oil per test a severe fire was obtained on the top, ground and throughout the pocket, as indicated by the accompanying picture.

Four $\frac{1}{4}$-in. oil drips located over the tank cover were allowed to add to the conflagration during some of these tests.

Selection of extinguishers for test purposes was influenced by such factors as cleanliness, electrical conductivity, supply, first cost, maintenance, etc. Three extinguishers were tested—CO_2 gas, water, and a chemical mixture of aluminum sulphate, bicarbonate of soda and water.

CO_2 Tests—Two methods of fighting fire with CO_2 gas were tried.

1. A ring-header system feeding eighteen $\frac{3}{32}$-in. nozzles equipped with discharge horns supported around the edge of the transformer top.

2. Three double-discharge horns on the same level as the transformer top and discharging across it.

Liquid CO_2 was supplied to these nozzles at approximately 700 to 800 lb. pressure. It was agreed that the CO_2 gas applied in this way would fight only the top fires, while a fire hose was used on the ground fires.

Water Tests—A total of twelve nozzles (called J-tubes because of hooked appearance) were arranged in two tiers on the two side walls of the transformer pocket. Only the lower tier of nozzles was used in the first tests, while both tiers were used in later tests, the upper set being used to spray the top and the lower tier the sides.

Chemical Mixture—The same nozzles used to spray the water were used for the chemical mixture.

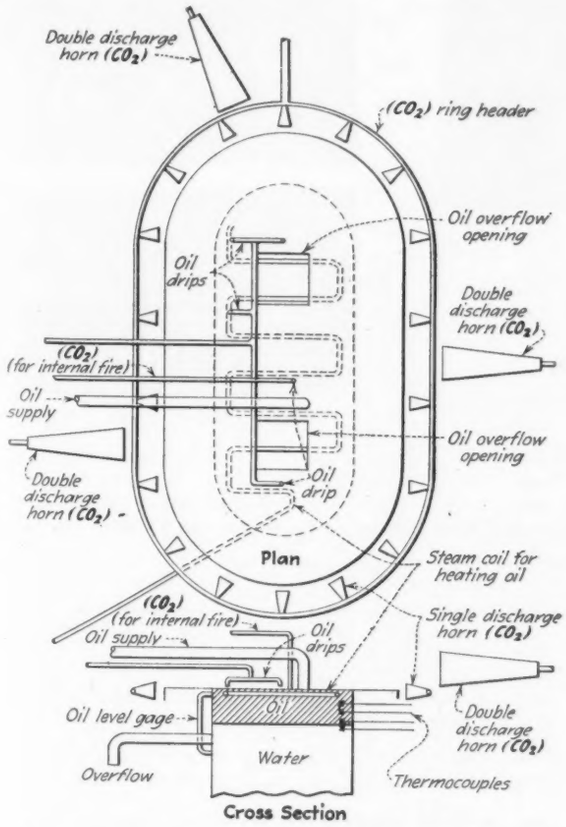
**Extracted from paper submitted in contest under N.E.L.A.-E.E.I. auspices and receiving James H. McGraw second prize.*

Results of Transformer Fire Protection Tests

Test No.	Date, 1932	Temp. ° C. Oil	Temp. ° C. Flame	Nature of Fire	Intensity	Extinguisher and Min. of Disch.	Piping Arrangement	Amount of Extinguisher Used	Time to Quench Top	Time to Quench Gr'd.	Results
1	4–1	140	...	Spill over	Top: Vigor; Grd: Small	Water 8	6 lower J-Tubes	.....	.....	.....	Failure
2	4–13	153	640	Spill over and drip oil	Top: Severe; Grd: Severe	Water 11	6 lower J-Tubes	.....	.....	4 min.	Success
3	4–14	159	658	Spill over	Top: Severe; Grd: Severe	Water 5	6 lower J-Tubes	875 gal.	4 min.	5 min.	Success
4	4–14	158	635	Spill over and drip oil	Top: Severe; Grd: Severe	Chem. Mix. 5	6 lower J-Tubes	.....	4 min.	4 min.	Success
5	4–19	159	655	Spill over and drip oil	.....	(CO_2) Gas 1	Ring header	300 lb.	.....	3 min.	Failure
6	4–19	Oil burn. from No. 5		Spill over	.....	Water 3	6 lower J-Tubes	825 gal.	1.75 min.	2.75 min.	Success
7	4–19	152	580	Spill over and drip oil	Top: Light; Grd: Severe	(CO_2) Gas 1.5	3 horn system	300 lb.	.....	.....	Failure
8	4–19	Oil burn. from No. 7		Spill over and drip oil	Top: Severe; Grd: Severe	Water 4	6 lower J-Tubes	700 gal.	3.25 min.	4 min.	Success
9	4–20	153	642	Spill over and drip oil	Top: Severe; Grd: Light	(CO_2) Gas 1.3	Ring header	300 lb.	1 min. reflash	.....	Failure
10	4–20	Oil burn. from No. 9		Spill over and drip oil	Top: Severe; Grd: Severe	Water 6	6 lower J-Tubes	1,050 gal.	3 min.	5 min.	Success
	4–20	153	660	Spill over	Top: Severe; Grd: Light	(CO_2) Gas .75	Ring Header	300 lb.	1 min.	2 min.	Success
	4–27	139	595	Spill over and drip oil	Top; Light; Grd: Light	Water 4	12 J-Tubes	1,750 gal.	3 min.	2 min.	Success
	4–27	148	630	Spill over and drip oil	Top: Light; Grd: Light	Chem. Mix. 3.5	12 J-Tubes	3 min.	3 min.	3 min.	Success
14	4–28	142	640	Spill over	Top: Severe; Grd: Severe	(CO_2) Gas .75	Ring Header	300 lb.	.....	2 min.	Failure
15	4–28	Oil burn. from No. 14		Spill over	Top: Severe; Grd: Severe	Chem. Mix. 4.5	12 J-Tubes	.....	3 min.	4 min.	Success
16	4–28	140	608	Spill over and drip oil	Top: Severe; Grd: Severe	Water 2.5	12 J-Tubes	750 gal.	1 min.	1.5 min.	Success
17	4–28	120	254	Internal	Light	(CO_2) Gas ...	1-inch pipe	100 lb.	1 min.	.....	Success
18	4–28	156	695	Spill over and drip oil	.....	(CO_2) Gas 1.3	Ring header	600 lb.	1 min.	2.5 min.	Success
19	4–28	151	410	Spill over and drip oil	.....	Chem. Mix. 3	6 upper J-tubes	.....	2 min.	7 min.	Success

Results of tests are tabulated. In the tests with CO_2 gas it was successful in extinguishing four top fires out of six involving both top and ground. With the facilities installed it had been agreed that the CO_2 would not fight the ground fires. The one internal fire tested was quenched in one minute.

With water only the first test was a failure and that was due to poorly shaped and located nozzles. They were changed so each discharge was in the form of a spray and joined that of the adjacent nozzle before reaching the transformer. Some of the test fires in which water was successfully used were the most violent of the entire program. The minimum time to quench a top fire was one minute and the maximum 4½ minutes. In every test the water spray was sufficient to quench the ground fire without the use of an auxiliary extinguisher. The time to quench fires was lowered by using both upper and lower tiers of nozzles, which collectively discharged 300 gal. per minute at 27 lb. pressure, compared with 175 gal. per minute for the lower tier alone.



Arrangement of test transformer for fighting fires

Results of the four tests with the chemical mixture were particularly satisfactory as three of the fires quenched were unusually severe. The reaction of the chemicals caused an uneven spurting discharge at the nozzles. A thin film of white chemical covered the transformers and walls of the pocket after the discharge of the extinguisher, but it was easily removed by the spray of a hose.

Conclusions

CO_2 gas was found suitable for extinguishing internal fires in transformers, but not reliable in controlling violent external fires. Ground fires required auxiliary extinguishing means.

The chemical mixture proved very effective in controlling severe top and ground fires without the use of an auxiliary extinguisher. It acts almost as quickly and is as reliable as water.

Water possessed the most desirable features for protection against outdoor transformer fires. It is relatively quick, its supply is unlimited, it is clean, requires small maintenance and can be supplied in flexible arrangements. The cost of installing the protection is very low.

▼

Analyzer Devised for Voltmeter Charts

Not finding just the right device available, three technicians of the United Electric Light & Power Company have developed one that enables them greatly to simplify their task of analyzing the 3,000 ft. of charts taken each week from 150 recording voltmeters spread over Manhattan's a.c. network. The task is to determine the number of chart hours during which the voltage was maintained within each of five bands of voltage. By the manual method of scaling and multiplying it was slow and tedious. By the new device much time is saved in preparing the monthly report for the guidance of those responsible for maintaining service voltage within defined limits.

There is one registering drum for each of the five ranges of voltage. Each of these drums is engraved with scales to fit three makes of charts. As the line on the chart shifts a key is pressed to bring the corresponding integrating drum into action. Rotation of a crankhandle introduces the time-duration element and at the same time feeds the chart into the machine. A sixth drum totalizes the volt-hours for the whole chart record.

Industrial Tide Surges Upward

Rising by leaps and bounds in virtually every branch of manufacturing and in all parts of the country, the general level of industrial activity in June surpassed that of a year ago by nearly 30 per cent, March of the current year by 35 per cent and May (revised) by 9 per cent. The June figure is subject to moderate revision, probably upward, when missing returns shall have been received, particularly for the automobile industry.

The most pronounced gains in recent months were reported in iron and steel, up fully 50 per cent from March, in metal-working, up 43 per cent, in textiles, up 46 per cent, and in rubber products, up 100 per cent. Some others were less spectacular only by comparison. A few months ago they would have seemed highly improbable.

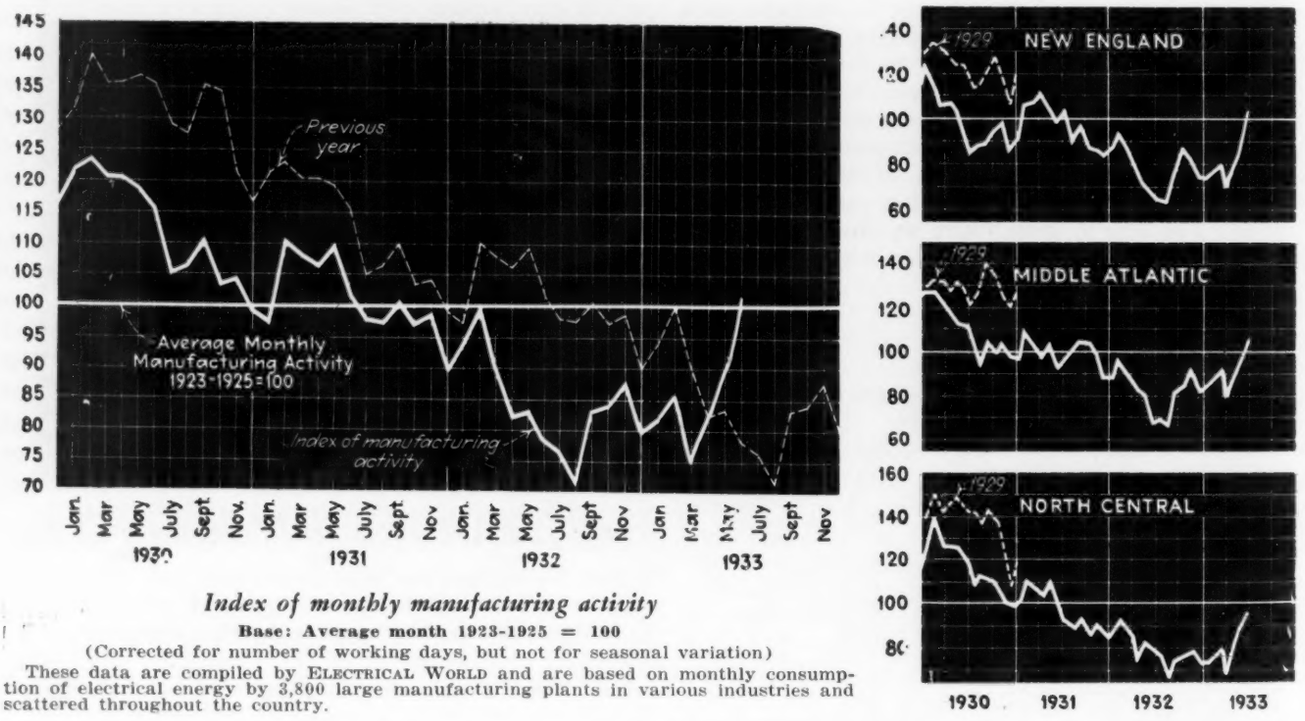
Thus, again referring to March as a starting point, we have such gains as 29 per cent in the relatively stable food industry, 23 in leather products, 27 in paper and pulp and 41 per cent in the stone, clay and glass group.

Taking up the major geographical regions separately, New England statistics point to a rise of nearly 50 per cent in the weighted average during the past three months, and of 55 per cent compared with June, 1932. During the same three months the percentage gain in iron and steel was 65, in metal working and the forest products group about 50, leather goods 27, textiles 61—most of it in the last month—while activity in the manufacture of rubber products virtually doubled as it did also in the North Central States.

In the Middle Atlantic States the general level is about 50 per cent higher than in June, 1932, and the rise over last March was close to 27 per cent. Last year's sag in textiles was replaced by a progressive rise, amounting to 27 per cent in three months. The metals, while still low in comparison with the 1923-25 base, gained 43 per cent.

In the North Central region the changes were, in general, similar to those indicated for the country as a whole.

Index numbers for the South and West will be announced in next week's issue.



Index of monthly manufacturing activity

Base: Average month 1923-1925 = 100

(Corrected for number of working days, but not for seasonal variation)

These data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 3,800 large manufacturing plants in various industries and scattered throughout the country.

	United States				New England				Middle Atlantic				North Central			
	June,	May,	Apr.,	June,	June,	May,	Apr.,	June,	June,	May,	Apr.,	June,	June,	May,	Apr.,	June,
Industrial Groups	1933	1933	1933	1932	1933	1933	1933	1932	1933	1933	1933	1932	1933	1933	1933	1932
All Industry	**101.0**	**92.9***	**84.4**	**78.1**	**104.3**	**85.7***	**73.8**	**67.3**	**102.4**	**97.3***	**86.3**	**68.5**	**95.7**	**89.1***	**79.8**	**80.2**
Automobiles (including parts and accessories)	62.3	58.9	54.8	65.9	....	....	....	....	58.7	55.7*	50.6	50.1	60.6	59.1	55.5	65.0
Chemical products (including oil refining)	130.7	127.1*	121.0	123.8	163.0	135.1*	143.0	143.0	135.0	131.0	124.6	131.0	129.4	129.3*	115.7	115.3
Food products	130.8	126.2*	119.7	118.4	....	....	....	....	130.0	129.5*	123.0	94.9	129.7	123.2*	115.6	123.7
Iron and steel	76.5	68.8*	62.3	55.8	135.7	108.8*	81.2	79.4	62.9	57.0	46.8	49.2	82.8	74.7*	71.8	57.8
Metal working	72.1	63.7*	55.3	53.0	98.6	82.0	68.7	68.5	63.9	57.2*	52.3	49.8	76.9	64.8	55.7	53.7
Metals group	73.0	65.5*	58.0	54.1	109.0	89.5*	72.3	71.5	63.5	57.1*	50.0	49.6	79.1	68.5*	61.8	55.0
Leather products	100.2	93.5	82.5	65.7	88.7	78.2*	73.3	61.2	125.8	119.4*	104.2	80.7	85.4	81.5	67.9	51.8
Forest products	93.5	91.3*	89.5	70.0	49.7	41.0*	38.9	43.9	51.8	52.0*	58.7	48.1	93.2	84.0*	71.4	71.5
Paper and pulp	121.8	112.0	102.3	95.8	115.8	112.5*	93.5	106.1	95.2	89.2*	74.0	60.2	121.0	104.4	103.0	94.2
Rubber products	136.4	124.5*	82.0	120.7	138.2	112.9	69.9	89.7	....	....	....	....	132.3	126.3*	80.2	126.4
Shipbuilding	75.7	71.3	73.0	85.1	....	....	....	....	....	....	....	....	....	....	....	....
Stone, clay and glass	97.2	90.0*	74.5	87.1	....	....	....	....	84.1	72.8*	49.7	72.7	110.5	105.7*	86.7	109.0
Textiles	115.2	96.4*	86.0	55.2	90.8	69.0*	61.6	42.6	137.2	132.2*	114.4	58.0	119.5	118.4	114.8	79.3

*Revision.

Production for Profits

By D. R. STEVENS
Vice-President Okonite Company

Labor desires work and not leisure.
Industry works under a suicide pact enforced by law.
Tax money for public works will not revive industry.

THE machine will never master man. How can it master man? It is inanimate. To use a homely example, a man who has an automobile will use that car as long as the car is an asset to him. The minute the car becomes a drain on his resources he will sell it or let it rust in the garage. Man will resume walking, because it is more profitable for him to walk and prosper than ride when he cannot afford to. Only what man needs or wants will survive.

I manage three small factories. The machines therein are not mastering me, nor my employers, nor employees. If we found that we could not afford to operate three we would undoubtedly shut one up. We would have done the same fifty years ago. My company has been through worse conditions than the present and has not shut up either in the days of long ago or the present.

Henry Ford, if he finds himself at an impasse, will not be downed by his machines. He will turn and struggle to find new ways to maintain employment. He might disintegrate his factories into small ones with farm setting round about the factories, or he might shut up shop altogether. Machines will not dominate Henry Ford today any more than when he started. If there is no profit in making automobiles or if there is no profit in owning automobiles, then that particular chapter will close, but the machines will rust. Man will not rust.

When we were in the war we expanded our factories to capacities beyond anything we had before. We did this for defense. If we are really sincere today about the machine age we could easily padlock the extra facilities that are not needed except as standby for defense. If we padlock these facilities and look at them the same as we do at a coast defense fort, certainly we cannot say that as they stand idle and rusting that machinery is mastering man. When man has no further use for any commodity he abandons it, destroys it, or sells it. The emergency fleet served its purpose and stood rusting until we got sick of looking at it and then we scrapped it. Did that machinery master man?

On the question of unemployment, let's get our feet on the ground. We were going along in a normal enough way until the war, and then we suddenly drafted all the labor we could get from everywhere. We dragged men off the farms and out of the hills. We brought women from their household labors, and when we compare unemployment figures today with unemployment figures before the war our present base must be way over our original base. We once passed child labor laws because children were cheap to employ and were being drafted into the ranks. I suppose today we wouldn't dare to pass women labor laws to put the women back in the home and the men back in the factories, for the obvious reason that women have obtained equal rights and they are willing to work for a lower wage than men. There wouldn't be so much factory unemployment today if all these men had not been drafted from the farms and the hills and there will not be so much when they go back.

Unemployment figures seem to be unreliable. For conversational purposes, may we assume that there are 10,000,000 unemployed and 30,000,000 employed. If the American voter will change the anti-trust laws and permit industry to operate with price and profit it would not be difficult at all for me as a factory manager to employ additional men by using helpers and research men. I could take up my share of the 25 per cent now unemployed—always assuming that orders are on hand and that business responds to its opportunity to achieve a profit. No one can employ any men when orders do not exist.

I would not oppose shorter hours or any other proved healthy plan. But I could increase my standard personnel as above without reference to any new ideas. Just give me back the old idea that industry is to be operated at a price with profit, thus taking the sales manager off my neck, and the men will come back. We factory managers have got the labor factor so low now that to cast it out altogether or to add 25 per cent to it makes little difference. Any increase would be ignored if there were a profit and if the American public decreed that it is an honorable act to employ men. Machines can easily lose their popularity. As a matter of fact, some are always dying out as new habits develop.

We certainly have unemployment in other lines than manufacturing. Is it fair to charge all unemployment to manufacturing? Is it the manufacturer's fault that the building trades have been declining since 1928? Suppose we had some wonderful low-cost inventions in tools in that trade. Wouldn't there then be a real demand for rebuilding the slums? The costs seem to be too high now. The movement seems to be forced. Yet there is

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In a series of three articles* Mr. Stevens discusses present business conditions from the point of view of a factory manager. His personal experiences and his intelligent comments are worthy of serious study by the industry. These articles are contributed as a part of the editorial program of "Electrical World" to render constructive aid to the electrical industry in meeting new conditions.—EDITORS.

**See* ELECTRICAL WORLD, *May 13, page 609, and June 3, page 716.*

work to be done some day—when we arrive at some point of balance where a practical result can supply a real demand. Man hates leisure today. He is crying to get to work. We have neither price nor profit today and the conditions seem unbearable.

The savants are implying that manufacturing industry should employ all the loose labor. We will prolong the fear of this Frankenstein as long as we try to make him support the whole of the unemployed. When people get tired of waiting for this fake god, or his handmaiden the dole, to give them a living, then nature will prompt them to go back to the soil. Fifteen hundred untrained men and women are starting back in Pennsylvania eagerly looking forward to the relief from waiting and waiting when nothing ever happens.

"Don't send them back," the farmer cries, "there are too many of us now!" "Don't keep them here," says industry. And the answer is in nature's ever-swinging pendulum. Man will fight against what he does not like, and (without the dole) he will fight against starvation in a fertile land. Man can have a living—nature provides for that—and no matter how many others exist on the soil, any other man has the same privilege to try to merit his living from the earth, whence all living comes. With industry, machinery and Frankenstein all "busted" and beginning to atrophy man must go toward the soil regardless of the number there before him. Give industry a fighting chance to make a profit, and if it succeeds man will return from the soil to reawakened factories and commerce.

Public works decrease taxes

These middle-of-the-road prophets who call upon government to press the magic button by initiating public works should be elected Secretary of the Treasury—or collectors of internal revenue—so that they can find the money. A few more false steps on taxation and there will be a national protest on the same plan as some of those Western counties, where the honest populace came and sat on the court house lawn and said: "Nothing doing!" Take all that nebulous and theoretical money for public work and save it. Just give industry and business the legal right to prevent suicide, let them try to get that same amount of money as a profit, and then there will be less complaint about taxation and unemployment. Every one says the government must increase its income, but nobody blows the whistle to start the game because the ball can't be found. Yet there it rests in the middle of the field in full view of the players, the officials and the crowd.

Industry has been long suffering in its nearly meticulous observance of the suicide pact forced upon it by the law. Industry should go sit on the government grass with the farmers' book in its hand and also say, "Nothing doing any more!" We don't need to fear the old day of the trust nor the old battle cry of "the public be damned!" Our evolution has carried us further than that. Our industrial leaders are high-minded—in many cases fanatic—in their desire to do right for their employees. Most of them, too, have come to believe that profitable commerce depends upon a well-paid working force. The line of distinction between employer and employee is now very hard to find. All are welded together in a common desire for national advancement. Even monopolies need not be too greatly feared. From an employment standpoint they are the least efficiently managed and with all their red tape and system they employ sometimes twice as many people as are really needed. Monopolies, trusts, or whatever you call them, no longer think in terms of wage slavery. Some of the biggest manufacturers lean over backward so far in their effort to be fair to labor as actually to develop unsound thinking.

On every side now we are hearing demands for planning—"economic planning." Most of the views suggest "governmental planning." Planning is all right as a common-sense word. But when we tack on the economic or governmental adjective, right away we introduce the subject into a controversial field. We can hardly obtain a stable majority opinion. Too many people distrust economists and object to governmental interference.

Herbert Hoover said to Congress in 1932: "In my message of a year ago I commented on the necessity of congressional inquiry into the economic action of the anti-trust laws. *There is wide conviction that some change should be made, especially in the procedure under these laws.*"

Calvin Coolidge said in April, 1930: "No doubt the public is obtaining commodities at prices below cost. But things are so ordered in this world that *it is not to the final advantage of the public to buy large supplies below cost. The reaction is sure to be bad. Some action for conservation without unlawful restraint of trade is needed for the present and future public welfare.*"

Must these words mean nothing? With so many calls for the use of imagination and common sense, can't we see the simple facts that when industry profits labor and government share the profits and when industry loses labor and government share the losses?

The rugged individual who was our forefather fought out his destiny unhampered by so much law, unguided by so much scholarship, undermined by no such charity and dole. His only insurance was his ability.

Question revival programs

In spite of these steady voices we go forward competing even in our revival programs. We see on the one hand a national movement to share-the-work which hopes (falsely) to restore employment and, competing with it, a national movement to renovate-your-plant, which means buy more labor-saving machinery and it hopes (falsely) to restore employment. There is no profit in industry to respond to either movement. Industry is selling its products below cost, labor is sharing its losses, and man is selling his labor below cost. He is receiving dole.

The government in confusion is spending taxpayers' money, that may not be collected, to build government buildings to employ a handful of people instead of authorizing the nation's industries to go ahead without fear and try to establish a profit. Rebuilding our industries does seem more important than building government buildings.

And now I get back to earth and to the starting point:

1. I am not an economist (world fixer).
2. I am only a little factory manager (employer of men).
3. Manufacturing industry only employs 10 per cent of the population.
4. But it is charged with most of our national troubles.
5. For the greater part of 21 years I have been getting rid of men.
6. Because the law said "Thou shalt compete" (or go to jail).
7. I could easily employ 25 per cent more men.

8. If my employer could make a profit (without going to jail).
9. He'd have a hard job anyway you arrange it.
10. I think he ought to have a fighting chance.

On calm analysis I find no panacea and nothing new in the above. Nor do I see any bugaboo of price-fixing or monopoly. And in favor I have named Gaskill, Montague, Swope, Fahey, Hoover and Coolidge. Why don't these men get some attention? Why do the technocrats and the economists and the debt eliminators and the foreign trade stimulators get all the important space? If Teddy were here he'd see the trouble and correct it.

Let's go back to a Monroe Doctrine for American industry. Let's stop industrial suicide. Let's change the working of the law to suit the times. Let's make up our minds that—

Buying below cost is unfair to labor.

AUTHOR'S NOTE—The above manuscript was completed in January, 1933, in accordance with a promise made to the editor of ELECTRICAL WORLD and published in the Readers' Forum of January 21, page 110. It was withheld for months by the writer because he feared that it would not be considered economically sound. The author was finally encouraged to submit the manuscript because of friendly remarks by Dexter S. Kimball, dean of the College of Engineering of Cornell.

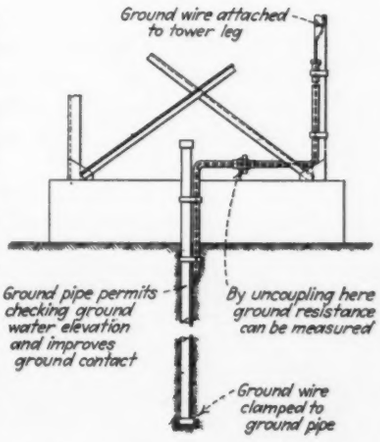
Between the date of acceptance and the date of publication the Roosevelt Administration announced an even stronger program for the resuscitation of industry and relief of unemployment.

Teddy is gone, but another Roosevelt is on the job. Let us hope the new program does not swing too far the other way.

▼

Corrects Impression on Holland Tower Grounds

Presentation of the method of grounding 150-kv. towers in Holland (in the December 24, 1932, issue of ELECTRICAL WORLD) was accompanied by an editorial comment to the effect that inclosing a ground wire in magnetic conduit increases its surge impedance appreciably and seems inadvisable. Mr. Kortlandt, the designer of the grounding method, points out in a statement recently received that the copper ground lead is not run inside the ground pipe, but is external to it and connected at the bottom. He says that the capped ground pipe not only provides an easy means of checking the level of underground water but furnishes a good contact with the earth. As shown by the accompanying drawing only a short section of the ground wire is inclosed in conduit —from the tower leg to a point adjacent to the ground pipe and just below the ground—to protect it against damage as required by Dutch rules. As previously stated, the union coupling is provided to permit disconnection of the ground wire from the tower and measure its ohmic resistance to ground. This short section of conduits aids the ground wire in discharging, Mr. Kortlandt claims.


Ground wire attached to tower leg
Ground pipe permits checking ground water elevation and improves ground contact
By uncoupling here ground resistance can be measured
Ground wire clamped to ground pipe

Method of grounding 132-kv. Holland towers

The cost of this method of grounding amounts to not quite 2 per cent of the cost of construction of the whole line, he reports, and results have been very good. No disturbances from atmospheric influences have been experienced where this type of ground is used, although one line so equipped has been in service twelve years and another 1½ years.

▼

Types of Outages and Their Lamp-Hour Durations

on Chicago Municipal Street Lighting System for 1931*

	1,000-Cp. System 7,217 Lamps		600-Cp. System 25,400 Lamps		400-250 Cp. System 29,416 Lamps		100-Cp. System 26,841 Lamps	
	Outages	Per Cent Lamp-Hours Lost	Outages	Per Cent Lamp-Hours Lost	Outages	Per Cent Lamp-Hours Lost	Outages	Per Cent Lamp-Hours Lost
Station trouble	12	0.0044	33	0.0047	21	0.0166	9	0.0023
Regulator	31	0.0062	70	0.0101	89	0.0176	110	0.0439
Cable-Multi-conductor, 5,000 v., l.c.	7	0.0087	27	0.0141	20	0.0282	5	0.0082
Cable—S.c., 5,000 v., l.c.	89	0.0273	257	0.0325	60	0.0144	186	0.0416
Cable—S.c., 5,000 v., armored	.....	.....	5	0.0013	33	0.0032	27	0.0080
Cable—S.c., 600 v., l.c.	38	.....	9	0.0024	1,127	0.0936	602	0.0479
Pothead—5,000 v.	5	0.0035	26	0.0031	13	0.0081	6	0.0057
Wilson joint—5,000 v., straightaway	3	0.0009	12	0.0018	29	0.0055	10	0.0021
Wilson joint—5,000 v.	37	0.0036	6	0.0008	166	0.0226	87	0.0159
Wilson joint—6,000 v.	2	.....	.....	.....	10	0.0003	2	0.0001
Temporary joint	1	.....	4	0.0001	5	0.0040	6	0.0042
Individual transformer	244	0.0224	77	0.0023	8	0.0003	9	0.0002
Group transformer	.....	.....	.....	.....	312	0.0468	290	0.0644
Stop-sign transformer	.....	.....	2	0.0002	.....	.....	8	0.0001
Stop-sign down	2	.....	37	0.0023	15	0.0003	68	0.0005
Post or pole	15	0.0008	151	0.0055	453	0.0070	783	0.0594
Compensator or fixture	32	0.0036	401	0.0422	.....	.....	.....	.....
Wire out, burned or broken at B.P.	128	0.0282	1,614	0.1728	34	0.0019	52	0.0054
Defective receptacle	103	0.0003	13	0.0002	67	0.0054	234	0.0227
Fixed hanger broken	16	0.0015	182	0.0081	.....	.....	.....	.....
Aerial wire down	30	0.0088	213	0.0345	50	0.0041	11	0.0007
Wire off insulator or broken	29	0.0032	273	0.0125	.....	.....	.....	.....
Lamp drop	24	0.0004	125	0.0172	.....	.....	.....	.....
Aerial wire in tree	11	0.0005	127	0.0027	5	0.0015	.....	.....
Outside cause	16	0.0029	74	0.0026	6	0.0007	4	0.0002
Unknown cause	57	0.0176	224	0.0286	142	0.0198	150	0.0274
Canopy chain on line	.....	.....	.....	.....	11	0.0001	42	0.0011
Film	.....	.....	.....	.....	635	0.0410	470	0.0438
Stop-and-go signals	.....	.....	4	.....	1	.....	14	.....
Mixed circuit-cause charged to other lamps	.....	0.0819	.....	0.0087	.....	0.0087	.....	0.0028
Street improvements	.....	.....	.....	.....	16	0.0210	9	0.0015
Miscellaneous	101	0.0055	349	0.0106	294	0.0085	219	0.0141
Totals	1,033	0.2322	4,315	0.4218	3,622	0.3812	3,413	0.4242

* Condensed from data in 35th annual report, Department of Gas and Electricity, city of Chicago.

Service Records of Treated and Untreated Poles

By R. M. WIRKA

*Associate Engineer Forest Products Laboratory.**
Forest Service, U. S. Department of Agriculture

This is the fourth of a series of papers† covering the service records of untreated and butt-treated poles and stubs, data on which have been collected by the Forest Service either alone or in co-operation with public utilities and private corporations. For detailed information on the sources of the poles and stubs, treating details, analyses of preservatives, and the like, the reader is referred to the 1926 report.

DATA available so far from the service tests of untreated and butt-treated poles and stubs reported in this paper seem to justify the following conclusions:

The serviceable life of poles is affected by such factors as changes in wire load, reconstruction and rerouting of lines, species, soil and climatic conditions, size, and treatment, if any. Each of these factors should be taken account of in considering the life to be expected from any group of poles.

Of the butt treatments under observation the hot-and-cold bath process with creosote has been found the most effective. The brush method is less effective than the hot-and-cold bath method, but its use may sometimes be permissible where it is impracticable to use a more thorough treatment. The extension of life resulting from brush treatments with a good preservative should generally be sufficient to more than pay for the cost of application. Two coats of a good preservative applied by brushing should generally be more effective than one.

Chestnut, Northern white cedar and Western red cedar poles that were butt treated with creosote by the hot-and-cold bath process are giving excellent service in the regions in which they are under test. Though the tops of the Western red cedar poles in southern California are being attacked by termites, they will give an average physical life of at least 25 years.

Lodgepole pine poles that were butt creosoted by the hot-and-cold bath process are giving long service in regions where top decay is not a factor; for example, in the higher altitudes of the Rocky Mountain regions. Under more severe service conditions lodgepole pine poles would need top treatment also if the maximum life is to be obtained from them.

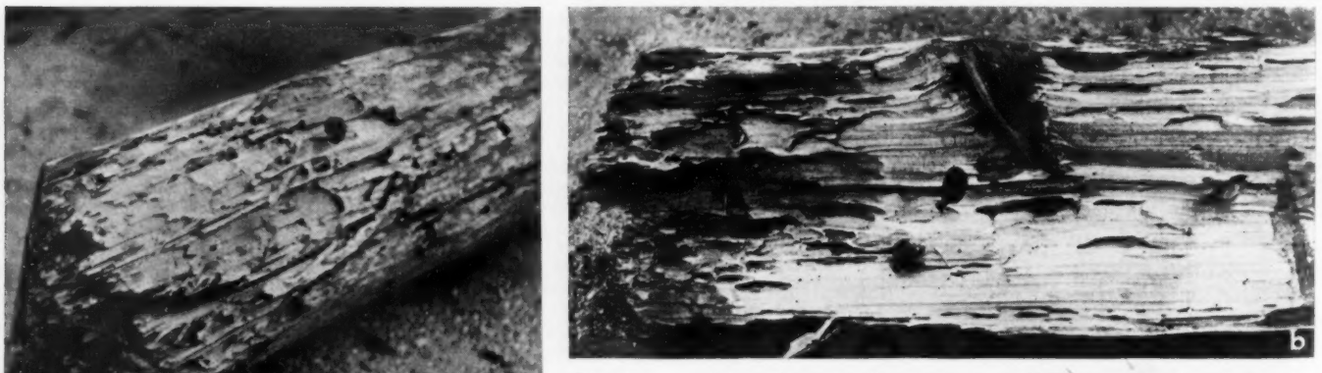
Tests with the ponderosa pine and white fir poles that were butt treated with creosote by the hot-and-cold bath process show that in the part of California where they are being used a top treatment also is necessary for maximum service.

While the data on treatments using "Anaconda Wood Preservative" (dust and granules) are not very comprehensive, they indicate that this material will not be so effective as the hot-and-cold bath treatment with creosote. Additional data must necessarily become available before an opinion can be expressed on the value of the paste form of the preservative when used on poles and stubs.

Increasing the resin content in pole butts by the method described in this paper proved of little value in extending the life of the lodgepole pine poles.

There appears to be no advantage in seasoning poles to be used untreated before setting them in line.

The extension of life to be accomplished by a thorough preservative treatment is proportionately greater



Figs. 1 a and b—Damage done to tops of Western red cedar poles by termites in Los Angeles
(b) shows top section split open to reveal internal damage.

**Maintained at Madison, Wisc., in co-operation with University of Wisconsin.*

†The first paper, by P. R. Hicks, appeared in the 1921 report and the second and third papers, by R. M. Wirka, appeared in the 1926 and 1927 reports respectively of the N.E.L.A. overhead systems committee.

Fig. 2—Butt-creosoted lodgepole pine pole in excellent condition after nineteen years

The soil has been dug away around butt to show condition at ground line. The pole is near Rifle, Colo.

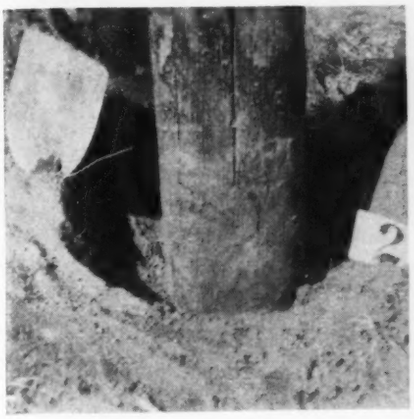


Fig. 3—Type of country through which Rifle, Colo., line runs

in poles of non-durable species than in poles of naturally durable species.

Butt treatments should extend well above the ground line if decay-producing fungi are to be repelled in that area.

Omaha-Denver Line—Chestnut and Northern White Cedar—This line of the American Telephone & Telegraph Company, includes experimental chestnut and Northern white cedar (*Thuja occidentalis*) poles extending about 50 miles between Ashland and Seward, Neb. The seasoning and treating of the cedar poles are discussed in Forest Service Circular No. 136, "The Seasoning and Preservative Treatment of Arborvitæ Poles," and the chestnut poles in Forest Service Circular No. 147, "Progress in Chestnut Pole Preservation," both published in 1908.

Creosote applied by brushing and by the hot-and-cold bath process and carbolineum applied by brushing were used on the poles of both species. Although treated in 1906, the poles were not set in line until nearly four years later.

The long storage period after treatment may have had a tendency to reduce the decay resistance of the treated poles, particularly those that were brush treated. The latest available inspection data on these poles was obtained in 1929 by representatives of the American Telephone & Telegraph Company. The condition of the poles at that time is summarized in Table I, which has been prepared by the Forest Products Laboratory.

The poles in this line that were treated by the hot-and-cold bath process are still resisting decay much more effectively than those that were brush treated. A higher percentage of the cedar poles that were treated with creosote by the hot-and-cold bath process when in a green condition have been removed on account of decay than those similarly treated when in a seasoned condition. The poles of both species that were brush treated with carbolineum are resisting decay more effectively than those similarly treated with coal tar creosote.

All of the untreated cedar poles and all but one of the untreated chestnut and two of the brush-creosoted chestnut and cedar poles were removed or deteriorated sufficiently to justify removal at the time of the 1929 inspection. Values for the average serviceable life of these groups of poles are given in the footnotes to Table I. In determining average serviceable life values removals for all causes, such as decay, line alterations,

Table I—Condition of Experimental Chestnut and Northern White Cedar Poles After 19 Years' Service on Omaha-Denver Line of the American Telephone & Telegraph Company

Data on condition of poles at the 1929 inspection based on data in an unpublished report of the American Telephone & Telegraph Company entitled "Results from the Preservative Treatment of Poles," dated August 3,1931. All poles set in 1910.

Preservative Used Sold as	Treatment (Butts Only)	Average Absorption of Preservative Lb. per Pole	Condition	Poles Set in 1910, No.	Good		Decaying		Removed or Recommended for Removal on Account of— Decay		Other Causes[a]	
					No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Chestnut[b]												
Carbolineum, *Avenarius*	Brush, 2 coats	4.9	Seasoned	92	1	1.1	14	15.2	71	77.2	6	6.5
Coal tar creosote	Brush, 2 coats	4.7	Seasoned	92[c]	..	....	2	2.2	88	95.6	2	2.2
Coal tar creosote	Hot and cold bath (open tank)	21.6	Seasoned	183	54	29.5	30	16.4	39	21.3	60	32.8
None	Untreated	....	Seasoned	181[d]	..	....	1	0.6	174	96.1	6	3.3
Northern White Cedar[c]												
Carbolineum, *Avenarius*	Brush, 2 coats	3.9	Seasoned	91	8	8.8	6	6.6	65	71.4	12	13.2
Coal tar creosote	Brush, 2 coats	4.4	Seasoned	95[e]	..	....	2	2.1	82	86.3	11	11.6
Coal tar creosote	Hot and cold bath (open tank)	....	Green	43	17	39.6	9	20.9	9	20.9	8	18.6
Coal tar creosote	Hot and cold bath (open tank)	48.0	Seasoned	138	58	42.1	1	0.7	..	....	79	57.2
None	Untreated	....	Seasoned	96[f]	..	....	..	....	91	94.8	5	5.2

[a] Includes poles removed on account of storm breaks, line alterations, woodpecker attack, accidental damage, etc., as well as those for which no record was made of the cause of removal.

[b] All poles held between three and four years after treating, before setting.

[c] Average life 13.7 years (estimated) based on removals for all causes.

[d] Average life 12.3 years based on removals for all causes.

[e] Average life 14.6 years (estimated) based on removals for all causes.

[f] Average life 12.9 years based on removals for all causes.

Table II—Condition of Experimental Chestnut Poles After About 24 Years' Service on Warren-Buffalo Line of the American Telephone & Telegraph Company

Data on condition of poles at the 1929 inspection based on data in an unpublished report of the American Telephone & Telegraph Company entitled "Results from the Preservative Treatment of Poles," dated August 3, 1931. All poles set in 1905. All seasoned poles were cut in 1902 and 1903 — treatments were made in 1905. Green poles were cut in 1905.

Preservative Used Sold as	Treatment (Butts Only)	Average Absorption of Preservatives Lb. per Pole	Condition at Time of Treating	Poles Set in 1905, No.	Good		Decaying		Removed or Recommended for Removal on Account of— Decay		Other Causes*	
					No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Coal tar creosote	Brush, 2 coats	7.5	Seasoned	85	9	10.6	68	80.0	7	8.2	1	1.2
Coal tar creosote	Hot and cold bath (open tank)	15.2	Green	28	18	64.3	5	17.8	1	3.6	4	14.3
Coal tar creosote	Hot and cold bath (open tank)	22.4	Seasoned	154	103	67.0	33	21.4	13	8.4	5	3.2
Carbolineum, *Avenarius*	Brush, 1 coat	2.0	Seasoned	8	0	0	5	62.5	3	37.5	..	....
Carbolineum, *Avenarius*	Brush, 2 coats	4.6	Seasoned	66	8	12.1	44	66.6	10	15.2	4	6.1
Carbolineum, S.P.F.	Brush, 1 coat	3.5	Seasoned	10	0	0	6	60.0	4	40.0	..	....
Carbolineum, S.P.F.	Brush, 2 coats	4.4	Seasoned	66	4	6.1	50	75.7	7	10.6	5	7.6
Creolin	Brush, 1 coat	3.4	Seasoned	16	0	0	12	75.0	4	25.0	..	....
Creolin	Brush, 2 coats	7.6	Seasoned	63	0	0	54	85.7	7	11.1	2	3.2
Wood creosote	Brush, 1 coat	2.4	Seasoned	21	0	0	20	95.2	1	4.8	..	....
Wood creosote	Brush, 2 coats	5.4	Seasoned	50	1	2.0	37	74.	9	18.0	3	6.0
Coal tar	Brush, 1 coat	....	Seasoned	48	0	0	38	79.1	9	18.8	1	2.1
None	Untreated	....	Green	192	0	0	161	83.9	26	13.5	5	2.6
None	Untreated	....	Seasoned	358	0	0	226	63.2	124	34.6	8	2.2

*Includes poles removed on account of line alterations, woodpecker attack, accidental damage, etc., as well as those for which no record was made of the cause of removal.

storm breaks, woodpecker attack and the like, are included. It may be noted that no significant difference was found in the life obtained from the two species when untreated or brush treated. With each species the average serviceable life values for the brush-creosoted poles were about 11 to 13 per cent higher than for the untreated poles.

Comparatively high percentages of the cedar and chestnut poles that were butt creosoted by the hot-and-cold bath process after seasoning have been removed for such causes as storm breaks, line alterations, accidental damage, and the like, the removals for these causes exceeding those for decay. Taking into account poles removed for all causes, it is estimated that poles of both species that were treated by the hot-and-cold bath process will give an average serviceable life of approximately twenty years. On the basis of decay resistance alone a considerably longer life would have been obtained.

Warren-Buffalo Line—Chestnut Poles—The experimental poles on this line of the American Telephone & Telegraph Company extend over about 45 miles between Warren, Pa., and Gowanda, N. Y., and were set in 1905.

The treatments and seasoning of the poles in this line are described in detail in Forest Service Circular 103, "Seasoning of Telephone and Telegraph Poles" (1907); Forest Service Circular No. 104, "Brush and Tank Pole Treatments" (1907), and Forest Service Bulletin No. 84, "Preservative Treatment of Poles" (1911).

At the last inspection, which was in 1929, made by representatives of the American Telephone & Telegraph Company, the poles had been in service about 24 years. The results are summarized in Table II.

As would be expected the poles in this line that were creosoted by the hot-and-cold bath process are resisting decay more effectively than those that were brush treated with creosote or other preservatives or untreated. The 1929 inspection disclosed little difference in the condition of the poles that were treated with creosote by the hot-and-cold bath process when green and those that were treated similarly when seasoned. Since the seasoned poles took the better treatment it would normally be expected that they would give the better results.

Table III—Condition of Experimental Western Red Cedar Poles After About 21 to 23 Years' Service in and Around Los Angeles, Calif.

Preservative	Treatment (Butts Only)	Absorption of Preservative Lb. per Pole	Poles Set, 1907-1909, No.	Results of 1930 Inspection: Butts Good Tops Good		Butts Good Tops Attacked by Termites		Butts Decaying or Attacked by Termites or Both Tops Good		Butts Decaying or Attacked by Termites or Both Tops Attacked by Termites		Removed on Account of: Butt Decay		Termite Attack in Tops		Butt Decay and Termite Attack in Tops		Removal All Causes Per Cent
				No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	
Carbolineum	Brush, 2 coats	5.3	29	..	...	1	3.5	..	...	6	20.6	22	75.9	..	...	.	...	75.9
Creosote *a*	Brush, 2 coats	6.5	27	..	...	..	...	..	...	9	33.3	16	59.3	1	3.7	1	3.7	66.7
Creosote *a*	Hot and cold bath (open tank)	31.0	194	9	4.6	82	42.3	8	4.1	48*b*	24.8	21	10.8	19	9.8	7	3.6	24.2
Zinc chloride	Hot and cold bath (open tank)	0.5*c*	58	..	...	..	...	7	12.0	17*d*	29.3	31	53.5	..	...	3*e*	5.2	58.7
Creosote *a*—zinc chloride	Hot bath, creosote... Cold bath, zinc chloride	0.25 lb. zinc *c* 0.7 lb. creo. *f*	30	..	...	..	...	5	16.7	13	43.3	11	36.7	..	...	1	3.3	40.0
None	Untreated	....	31	..	...	..	...	1	3.2	4	12.9	26	83.9	..	...	.	...	83.9

*a*Purchased as a coal tar derivative but tests of specific gravity, index of refraction and sulphonic residues indicate that it was a water-gas-tar product.

*b*Two poles have decay in tops.

*c*Dry zinc chloride per cubic foot.

*d*One pole has decay in top.

*e*One pole was severely attacked by termites at butt.

*f*Per cubic foot.

Final conclusions on these rest on additional data.

With the exception of a few poles that were brush treated with *Avenarius* carbolineum, coal tar creosote, S.P.F. carbolineum, and wood creosote, all of the brush-treated and untreated poles still in service contain decay. The poles that were given a two-coat brush treatment are resisting decay more effectively than those that were given a one-coat brush treatment with the same preservative excepting the two groups treated with wood creosote. Seasoning poles to be used untreated did not increase their decay resistance, a smaller percentage of the untreated poles set green having been removed than of those set untreated after seasoning. Since the seasoned poles were kept two or three years before setting, there is a possibility that some deterioration began before they were installed. The untreated poles that were set while in the green condition are also lasting better than the seasoned poles that were given a one-coat brush treatment with coal tar, *Avenarius* carbolineum, S.P.F. carbolineum, or creolin, or those that were given a two-coat brush treatment with *Avenarius* carbolineum or wood creosote. The results of future inspections must be obtained, however, before definite conclusions can be drawn regarding the relative durability of these groups.

The results thus far indicate that the service conditions on the Warren-Buffalo line are much less severe than on the Omaha-Denver line. On the latter line, for example, untreated chestnut poles gave an average life of a little more than twelve years, whereas the untreated chestnut poles on the Warren-Buffalo line had been in service about 24 years at the time of the 1929 inspection, with only about 37 per cent of the seasoned and 16 per cent of the green poles removed for all causes. Both the seasoned and green untreated chestnut poles on the Warren-Buffalo line should give an average serviceable life well in excess of 24 years.

Southern California—Western Red Cedar—This experiment includes untreated and butt-treated Western red cedar poles set in and around Los Angeles, Calif., and is being conducted in co-operation with the Los Angeles Gas & Electric Company, Pacific Electric Company, Southern California Telephone Company, Southern California Edison Company and the Los Angeles Bureau of Power and Light. The test originally comprised about 900 poles, but a high percentage of them have had to be eliminated for various reasons during its progress. A number of the poles were set too deep—that is, with the ground line above the treated area—others were set in concrete, making it impossible to inspect thoroughly, and many were removed on account of changes in lines without any record having been kept of their disposal or condition at the time of removal.

The results of an inspection made in 1930 are given in Table III. The pole butts that were treated with creosote by the hot-and-cold bath process were in much better condition after about 21 to 23 years' service than those treated by any of the other processes. The combination creosote-zinc treatment has, to date, proved next in effectiveness, followed in order by zinc chloride applied by the hot-and-cold bath process, creosote brushed and carbolineum brushed.

Both decay and termites are responsible for the destruction of these poles. Decay, with few exceptions, has been confined to the butts of the poles, while termites have been active both in the butts and above the ground line. The principal species of termites that attack the poles in this region are *Kalotermes minor*, a dry-wood termite that works above the ground line, and *Reticulitermes hesperus*, a subterranean termite that attacks the butts of the poles.

Table IV—Condition of Untreated Experimental Western Red Cedar Poles After About 14 Years' Service

In the trolley and transmission lines of the Chicago, Milwaukee & St. Paul Railroad, extending from Harlowton, Mont., to Avery, Idaho

Number of Poles Set in 1915–1916								Stubbed on Account of Decay	
Type				Good		Decaying			
Trolley	Transmission	Total	Location	No.	Per Cent	No.	Per Cent	No.	Per Cent
15	..	15	Harlowton, Mont.	..	...	2	13.3	13	86.7
5	15	20	Lennep, Mont.	1	5.0	12	60.0	7	35.0
5	15	20	Ringling, Mont.	..	...	11	55.0	9	45.0
..	20	20	Nissler, Mont.	..	...	..	....	20	100.0
5	15	20	Morel, Mont.	..	...	4	20.0	16	80.0
5	15	20	Bearmouth, Mont.	1	5.0	14	70.0	5	25.0
35	80	115		2	1.7	43	37.4	70	60.9

Of the poles that received the hot-and-cold bath treatment with creosote about the same number have been removed on account of termite attack above the ground as have been removed on account of decay in the butts. Of the 147 poles having this treatment that are still in service, all but seventeen have their tops attacked by termites. Ninety-one of the 147 poles show neither decay nor termite attack in the butts. It therefore appears that termite attack in the tops may be more responsible than decay in the butts for the removal of these poles in the future. In other words, the tops of the poles probably will not, on the average, last so long as the treated butts.

Nearly all removals to date of poles with the other treatments have been made on account of butt decay. Those still in test have either decay or termite attack, or both, in the butts and tops. The results indicate that, on an average, the tops of these poles will be serviceable at least as long as the butts and possibly longer. The tops of experimental poles damaged by termites are shown in Fig. 1a and b.

It appears that under service conditions similar to those that have prevailed in this test the tops of Western red cedar poles having the butts treated either with creosote or a combination of creosote and zinc chloride by the hot-and-cold bath process must be given some kind of preservative treatment if they are to remain serviceable as long as the butts. With any of the other kinds of butt treatments included in this test or with untreated poles the life of the butts will not be long enough to require top treatment.

It is believed that the poles in this test that were treated with creosote by the hot-and-cold bath process will give an average life of at least 25 years in spite of the termites. It is estimated that the untreated poles will have an average life of about sixteen years. The average life of the brush-treated poles will be somewhat longer than sixteen years.

Chicago, Milwaukee & St. Paul Railroad—Western Red Cedar—This test includes 115 poles, with an average ground line diameter of slightly more than 14 in., selected for a service test out of a total of about 30,748 untreated Western red cedar poles used by the C. M. & St. P. R.R. in 1915 and 1916 in the electrification of its Western lines between Harlowton, Mont., and Avery, Idaho.

At the time of the last inspection in 1929 the poles had been in service about fourteen years. At that time about 61 per cent of them had been stubbed on account of decay (Table IV). It is estimated that the average life of these poles without stubs will be approximately fourteen years. Had the butts been given a thorough

Table V—Condition of Experimental Lodgepole Pine Poles and Stubs in Colorado and Montana

Butt creosoted by the hot-and-cold-bath open-tank process

Experiment No.	Location	Type	Condition	Average Absorption	Date of Setting	No. of Poles in Test	Size	Date of Last Inspection	Good No.	Good Per Cent	Decaying No.	Decaying Per Cent	Removed on Account of Butt Decay No.	Removed on Account of Butt Decay Per Cent
1	Rifle, Colo.	Poles	Fire-killed	8.5 lb. per cu.ft.	1909	525	10-11 in. D at ground line 30-35 ft. in length	1928	452a	86.1	19	3.6	54	10.3
2	Dillon, Mont.	Poles	Seasoned	1.3 gal. per pole	1920	188	9-11 in. D at ground line	1931	170	90.4	18	9.6	..	....
3	Missoula, Mont.	Poles	Dry, fire-killed	½-1 gal. per pole	1915	32	6-7 in. D by 18 ft. in length	1926	14	43.8	4	12.4	14	43.8
4	Choteau, Mont.	Stubs	Seasoned 6 mos.	9.8 lb. per cu.ft.	1917	467	7 in. D by 8½ ft. in length	1930	467	100.0	..	....	..	....
5	Rocker, Mont.	Poles		4.3 lb. per cu.ft.	1912	3	8-9½ in. D at ground line	1931	3	100.0	..	...	..	....

a12 poles had slight decay in tops.

hot-and-cold bath treatment with a good grade of coal tar creosote their life would have been materially extended. The railroad company is furnishing stubbing records on the entire 30,748 poles which, when complete, will permit a determination of the average life of all the poles on the lines.

Montana Power Company—Western Red Cedar—Records are being kept on 2,100 Western red cedar poles butt creosoted by the hot-and-cold bath process. These poles were set in 1919 and 1920 on lines radiating from Lavina, Mont., to Harlowton, Billings and Roundup, Mont. The average absorption of creosote was about 4½ gal. per pole.

In 1929 after about ten years' service none of the poles had been removed on account of decay. A total of 53 of these poles, located in various parts of the lines and representative of the different service conditions prevailing in the test, were carefully inspected in 1929 by digging away the soil at the base of each pole. All of the poles examined were in good condition, showing no decay, and it is believed that their condition is representative of the condition of the other poles on the lines.

Savannah-Meldrim Line—Chestnut and Southern White Cedar—The experimental poles in this line of the American Telephone & Telegraph Company were set in 1905 and extend from Savannah to Arden, Ga., a distance of about 20 miles. The test includes chestnut and Southern white cedar poles untreated and brush treated with *Avenarius* carbolineum, coal tar creosote, creolin, S. P. F. carbolineum, Spirittine, wood creosote and coal tar.

Until 1921 these poles were inspected at intervals of slightly less than two years. It was decided then to discontinue the regular inspections because nearly all of the Southern white cedar poles and a high percentage of the chestnut poles had been removed on account of decay and those still in service contained decay.

This experiment demonstrated that only a small increase in life can be expected from brush treating the butts of chestnut and Southern white cedar poles when they are to be used under the severe service conditions that prevail in the region through which this line runs. A detailed discussion of the results obtained from this test up to the time of the last inspection in 1921 is contained in the 1926 paper.†

Stokes Mountain Line—Ponderosa Pine—The final inspection of the ponderosa pine (Western yellow pine) poles on this line of the San Joaquin Light & Power Company, near Fresno, Calif., was made in 1917, after the poles had been in service about nine years. The experiment included poles that were butt treated by brushing with carbolineum and creosote; poles that were butt treated by the hot-and-cold bath process with creosote, zinc chloride and crude petroleum, and untreated poles.

This experiment was discontinued when it was found that most of the poles given the more thorough butt treatments were becoming unserviceable on account of decayed tops. The experiment demonstrated the necessity of top treatment as well as butt treatment of ponderosa pine poles under the climatic and soil conditions prevailing in the Fresno region. It is believed, however, that a milder treatment than that given the butt would give the necessary protection to the tops. A detailed discussion of the results from this test is given in the 1926 papers.†

Rifle Heat, Light & Power Company Line—Fire-Killed Lodgepole Pine—A total of 525 fire-killed lodgepole pine poles that were butt treated with creosote by the hot-and-cold bath process are included in a test on the line near Rifle, Colo.

When these poles were inspected in 1928, about nineteen years after setting (Table V, Experiment No. 1), only about 10 per cent had been removed on account of decayed butts and more than 86 per cent were classified as containing no noticeable decay in the butts. The inspection of the butts was made by observing each pole at the ground line and digging away the soil from every fifth or sixth pole for a thorough examination of the area below the ground line. The condition typical of the ground line area of the inspected poles classified as is good condition is shown in Fig. 2; views of the country over which the line runs are shown in Fig. 3.

The top of each of the 471 poles still in line was observed at the 1928 inspection to determine the amount of decay and checking. The tops of only twelve poles showed a little decay, which indicates that under the conditions surrounding these poles top decay in lodgepole pine poles need not be reckoned with and only a butt treatment is required to give the necessary protection. This fact has been observed elsewhere in the Rocky Mountain region and seems generally true throughout the dry areas in the Rocky Mountain states.

About 23 per cent of the 471 poles still in line contained large checks; that is, checks from about ¾ in. to 1 in. wide, with a few more than 1 in. wide. All of the other poles were checked to some extent, the checks ranging from very small to about ¾ in. in width. It is believed, however, that checking in the tops will be responsible for the removal of very few, if any, of the poles.

With such a small percentage of the poles removed, it is impossible to make a reliable estimate of the average life these poles will yield, but it seems safe to say that it will in all probability be considerably more than 25 years. While this experiment included no untreated poles, it is estimated that under similiar conditions of service untreated poles would probably be removed for butt decay after an average life of from seven to nine years.

Dillon-Rattlesnake Creek Line—Lodgepole Pine—This Forest Service telephone line on the Beaverhead National Forest (Mont.) includes 188 lodgepole pine poles that were butt treated

†*See footnote on page 116.*

with creosote by the hot-and-cold bath process and set in 1920. An analysis of the creosote used in treating the poles indicated that it was a water-gas-tar derivative

At an inspection in 1931, after about eleven years' service, about 90 per cent of the poles were still in good condition with about 10 per cent showing some decay in the butts. None of the poles has been removed on account of decay (Table V, Experiment No. 2).

Missoula-Seeley Lake Line—Lodgepole Pine—The 32 lodgepole pine poles under observation on this Forest Service telephone line in Montana were butt treated with creosote in various ways; some by a hot bath only, some by a cold bath only, and a few by the hot-and-cold bath process. The poles were set in 1915.

This experiment was discontinued in 1926 when the line was abandoned and the poles removed. The condition of the poles at the final inspection in 1926 is given in Experiment No. 3 of Table V.

The results obtained were not nearly so satisfactory as those from some of the other groups of butt-creosoted lodgepole pine poles discussed in this paper. The poor service rendered by these poles is attributable to the following causes:

1. The creosote used was undoubtedly of a low grade, the report covering the treatment stating that the oil was amber in color and of about the same consistency as kerosene. It was also very volatile, evaporating rapidly at a temperature of 185 deg. F.
2. The butts were not treated high enough to permit at least 6 in. of treated wood above the ground line when the poles were in place. Several poles showed no creosote above the ground line.
3. The butts of some of the poles were not well barked before treatment and an uneven penetration resulted.
4. The hot-and-cold bath treatment, which is the best of the non-pressure methods, was used on only two of the poles, the rest being treated by either a hot bath or a cold bath alone.

Choteau-Ear Mountain Telephone Line—Lodgepole Pine—The 467 lodgepole pine pole stubs under observation in this experiment were set in 1917 to reinforce a Forest Service telephone line on the Lewis and Clark National Forest, Montana. The stubs were treated with creosote by the hot-and-cold bath process. Although no analysis was made, the creosote was believed to be a water-gas-tar derivative.

The stubs were inspected in November, 1930, about thirteen years after installation. Each stub was observed at the ground line and every tenth stub was dug out to a depth of 8 to 10 in. for a careful inspection below the ground line. With the exception of one stub that had burned there had been no removals and no decay was observed (Table V, Experiment No. 4).

Anaconda Copper Mining Company Poles—Lodgepole Pine—This installation originally included eleven lodgepole pine poles serving as markers and flagpoles on a rifle range near Rocker, Mont. The poles were butt creosoted by an "empty-cell" hot-and-cold bath process; that is, the ordinary hot-and-cold bath operations were followed with a hot bath for several hours for the purpose of recovering part of the oil.

When inspected in 1931 all but three of the poles originally set were found to have been removed, none of them, however, on account of butt decay. The three poles still in place were found to be in good condition in 1931 after about nineteen years' service (Table V, Experiment No. 5). While the results from only three poles do not justify drawing definite conclusions, they add weight to the results of the various other test lines which show that lodgepole pine poles, given a hot-and-cold bath butt treatment with creosote, will effectively resist decay under the service conditions that prevail throughout much of the Rocky Mountain region.

Results obtained with some newer experiments will be presented in a later issue.

▼

Electric Furnaces Advantageous for Bright Annealing Cold Strip

Bright annealing of cold steel strip in coils affords an excellent application for electric heat, reports the General Electric Company, there being a production of about 688,000 tons per year (in 1931) which has to be bright annealed as the last operation before it leaves the mill. Much of it has to be given one or more annealing treatments in process. If only one annealing treatment were given this production would require about 230 bell-type

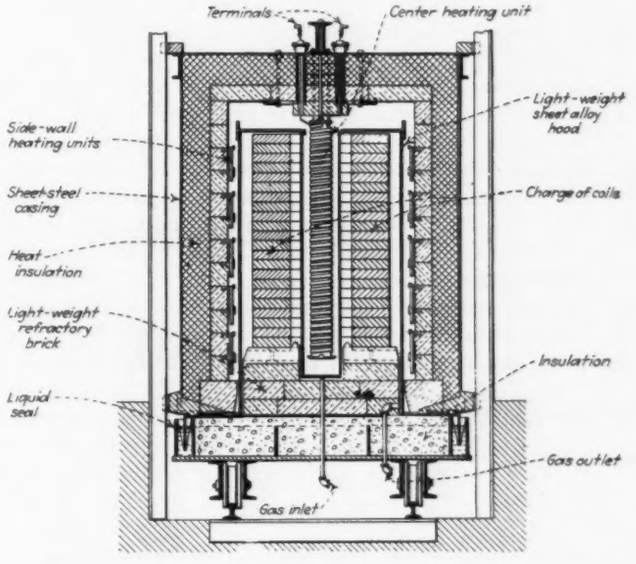


Fig. 1—Sectional view of electric bell-type furnace

electric furnaces using 117,000,000 kw.-hr. per year. At present there are about 50 such furnaces in successful operation.

One factor that makes application of these furnaces particularly attractive now is that they enable steel mills to fill small orders for cold strip quickly—a necessity, because most users thereof are trying to keep their inventories to a minimum and are buying only as needed, relying on the mills to make short shipments. Since the annealing cycle for low-carbon strip in the bell-type furnace is only about half that in fuel-fired equipment the users of electric furnaces are in a particularly good position to fill rush orders. In fact, low-carbon strip can now be pickled, rolled, electrically annealed and shipped in less than 48 hours.

Added to this advantage are the low annealing cost, high quality of product, flexibility of operation, low maintenance, improved working conditions.

Comparison of operating costs of a typical installation of bell-type furnaces with fuel-fired furnaces follows:

	Electric Annealing in Bell Type Furnace per Ton	Fuel Annealing in Pots per Ton
Hoods or pots	$0.22	$0.80
Electric energy at $0.01 per kw.-hr	1.31	....
Oil at $0.065 per gal. at burners	....	2.82
Labor	0.30	0.69
Overhead	0.30	0.69
Gas for atmosphere	0.13	....
Iron chips	....	0.03
General maintenance	0.03	0.09
Insurance, interest and taxes	0.32	0.26
Obsolescence	0.44	0.33
Over-all cost per ton	$3.05	$5.71

The saving of $2.66 per ton by annealing electrically represents an annual saving of $9,000 per furnace for this installation. The major saving is in the energy charge, due to the fact that very little material has to be heated other than the product. On the other hand, steel, being annealed in fuel-fired furnaces, is placed in massive steel pots and packed in borings or charged on heavy cast steel bases under heavy cast steel covers, having a combined weight two to three times that of the charge.

Uniformity of heat treating with the bell-type furnace is best illustrated by the small temperature variation throughout the charge, as measured by thermocouples and shown in Fig. 2. The controlled atmosphere maintained during the heating and cooling cycle protects the charge from oxidation, allowing it to be brought from the annealing equipment with practically the same quality of surface finish as it left the rolls, so that it may be shipped without further preparation.

The long annealing cycle in fuel-fired furnaces (about 80 hours) which is necessary because of the heavy cast pots or covers is reduced to from 36 to 54 hours with the electric furnace, because of the light hoods and bases. In one typical bell-type furnace rated at 90 kw. and accommodating a charge of 2½ to 5 tons, the heating-up time varies from 6 to 14 hours. For low-carbon strip this represents the total heating time, while for high-carbon material an extra 4 to 6 hours soaking period is required. The cooling time varies from 30 to 40 hours. In one installation where low-carbon strip is annealed in charges weighing about 5 tons the heating up time to 1,200 deg. F. averages 13 hours, the economy over a four-month period being 131 kw.-hr. per ton. High-carbon strip, in 5-ton loads, has a heating up time of about fifteen hours to 1,320 deg. F. and is cooled in the furnace about three hours, giving an economy of 188 kw.-hr. per ton over a four-month period. Purified city gas is used for the non-oxidizing atmosphere with a consumption of about 160 cu.ft. per ton.

By equipping each bell-type furnace with about five bases several loads can be cooling while one is heating, thereby securing maximum use of the furnace investment. This flexibility of operation is permitted either by mounting the bases on trucks, which can be moved to fixed furnace positions, or keeping the bases in fixed positions and moving the furnaces.

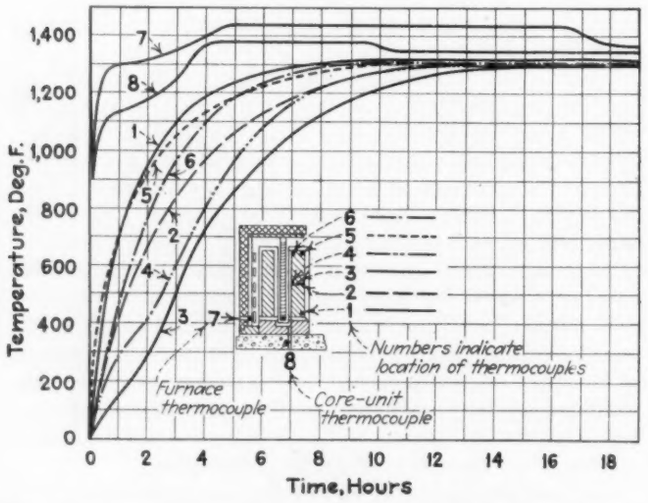


Fig. 2—Temperature uniformity in electrically heated strip

Chart Traces Course of

Industrial activity, after a three-year decline, began to increase moderately late last summer. Following the setback accompanying the financial disturbances there has been a pronounced upward movement.

Energy output of central stations, holding up well during 1930 and 1931, sagged severely in 1932, then violated spring-time precedent by climbing in June to the previous midwinter's peak.

Revenue, consistently lagging behind physical operations and in summer responsive to the decreased lighting load, is due to follow with its own upturn.

Operating expenses have been radically diminished.

The chart on the opposite page traces the monthly changes. In per cent the fluctuations of the light and power industry have been much smaller than the variations in manufacturing activity.

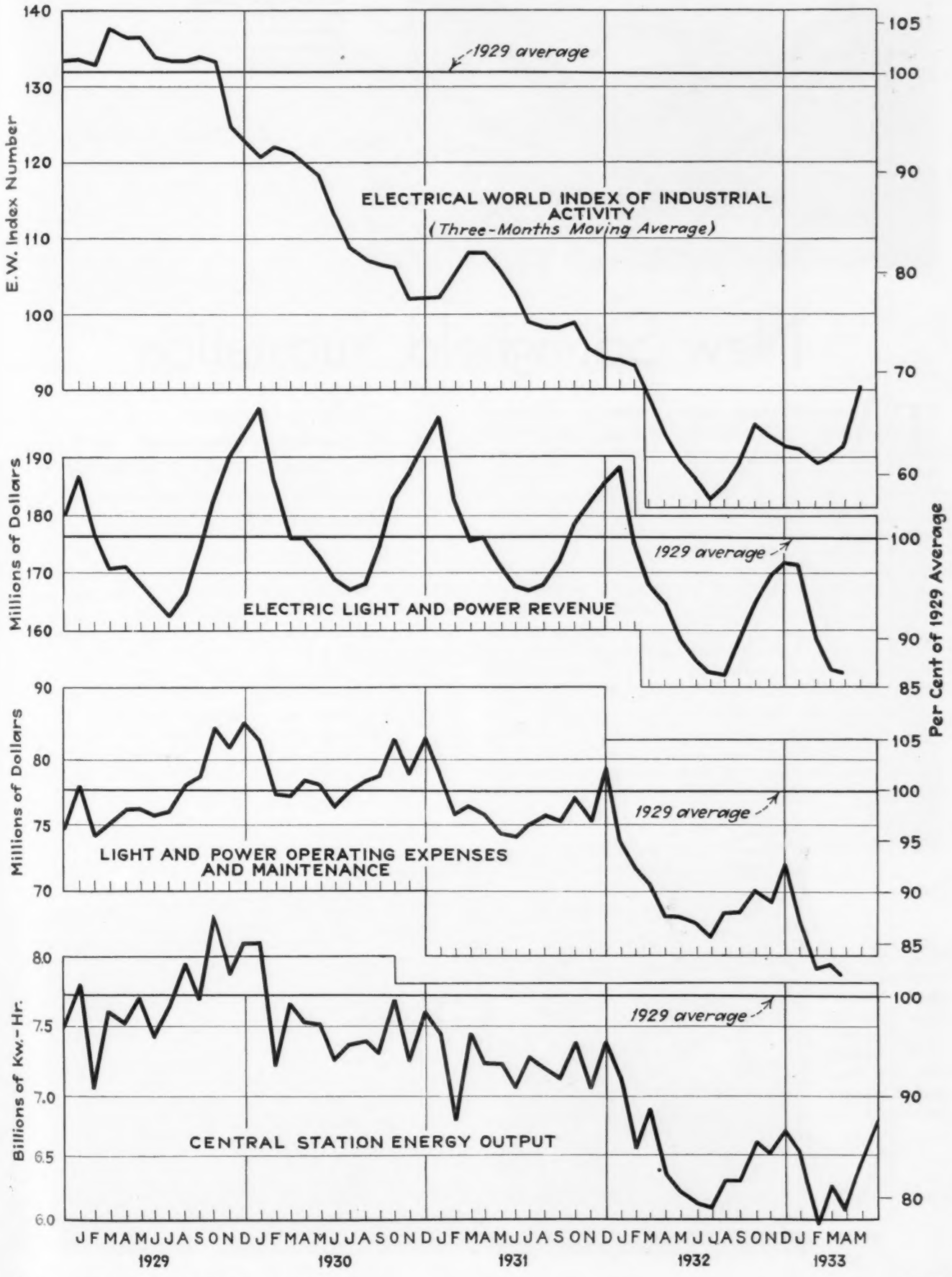
Half the Copper Used Electrically

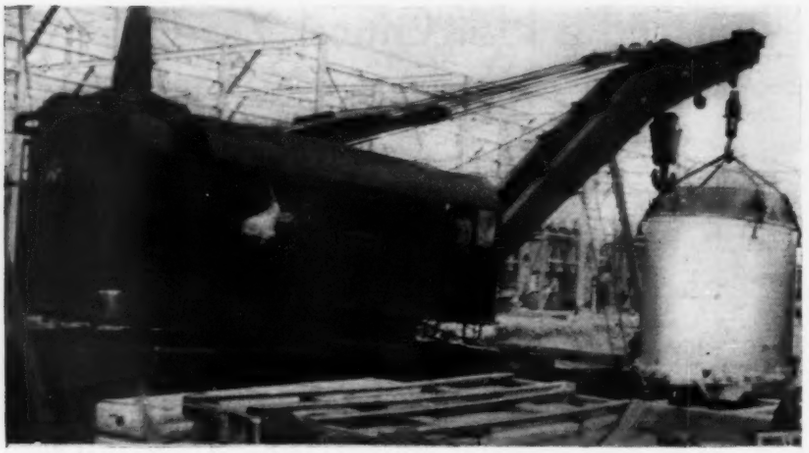
About half the copper used in the United States goes directly into electrical materials and supplies, according to estimates in the Year Book of the American Bureau of Metal Statistics. These electrical uses during recent years, with totals for all purposes for comparison, are given in tons of 2,000 lb. as follows:

Purpose	1929	1930	1931	1932
Electrical manufacturers	261,000	221,000	162,000	90,000
Telephones and telegraphs	164,000	122,000	70,000	27,000
Light and power lines	127,000	130,000	85,000	41,000
Radio receiving sets	15,500	13,000	10,000	7,000
Electric totals	567,500	486,000	327,000	165,000
U. S. totals	1,159,800	956,150	650,000	360,000
Per cent electric	49	51	50	46

World production in 1932 aggregated 972,720 tons of 2,000 lb., of which North America produced 424,408; South America, 140,985; Europe, 150,482; Asia, 88,373; Australasia, 16,510; Africa, 141,962, leaving an estimated 10,000 tons not allocated. World production in 1928 was 1,892,350; 1929, 2,127,834; 1930, 1,733,706, and 1931, 1,481,969 tons.

Electrical Industry During Four and a Half Critical Years





Locomotive crane on railroad siding unloading 22,500-kva. transformer onto its foundations in East Springfield substation

By LESLIE R. HICKS

Consulting Electrical Engineer
Formerly Engineer
Western Massachusetts Companies

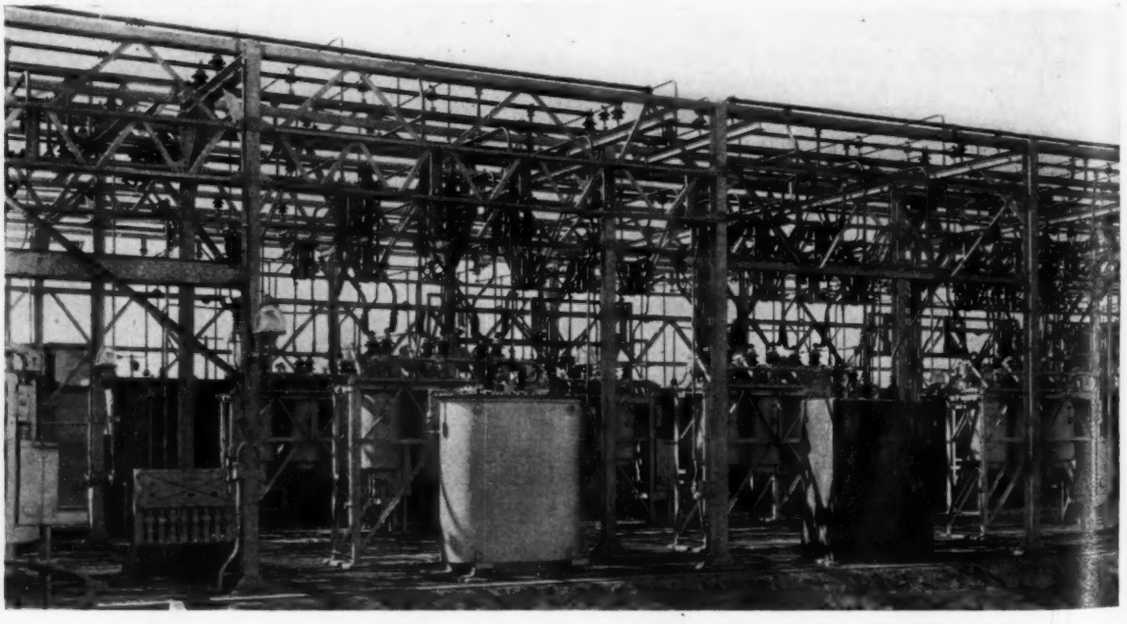
New Springfield Substation

Oil piping eliminated.
No transformer house used.
13-kv. leads terminate at transformers.
Grounding transformers on 13-kv. bus.
Miniature switchboard used.

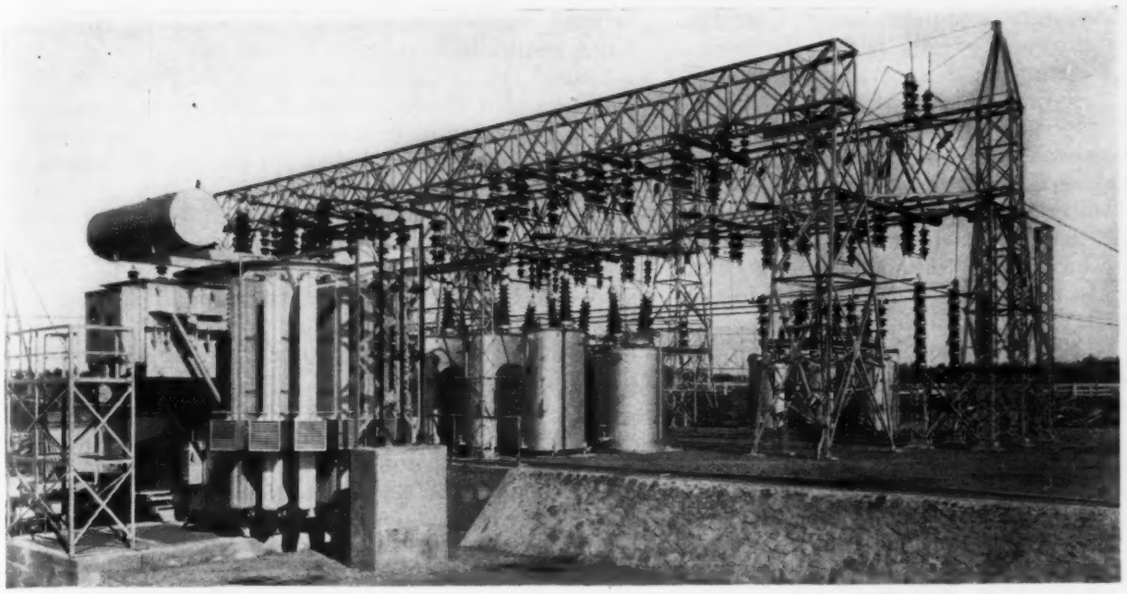
THE United Electric Light Company recently completed a 115-kv. high-tension and 13-kv. feeder outdoor substation in East Springfield, Mass., which was constructed to provide a second high-tension supply for the city of Springfield to duplicate the one built a number of years ago in West Springfield. This means that the city will always have two sources of high-tension supply from the Turners Falls Power & Electric Company system. The general arrangement of the yard layout is shown in the plan. No oil piping was installed, for the company plans to use a portable oil filtering and testing outfit, and no oil tanks were installed as this is to be taken care of with a portable aluminum tank mounted on a trailer. It is equipped with an electric pump and has pipe connections from the three sections of the tank for handling various kinds of oil.

In the West Springfield substation there is a transformer overhauling station building completely equipped with an electric crane. A railroad siding into the East Springfield substation cost only about 25 per cent of what another transformer building fully equipped would have cost, therefore no transformer building was erected at East Springfield. The railroad agreed to rent its locomotive crane for unloading and erecting the power transformers, which are usually shipped in sections.

The 13-kv. transformer leads are run in fiber conduit under the railroad siding. Inasmuch as the amount of current was large, single-conductor "Kerite" 15-kv. cable with metal-woven wire braid under the weatherproof braid was installed. The end of the cable is made on the roof bushing in the top of a pull box cast in the concrete



13-kv. yard of East Springfield substation showing transformer and junction box for control of breaker solenoids

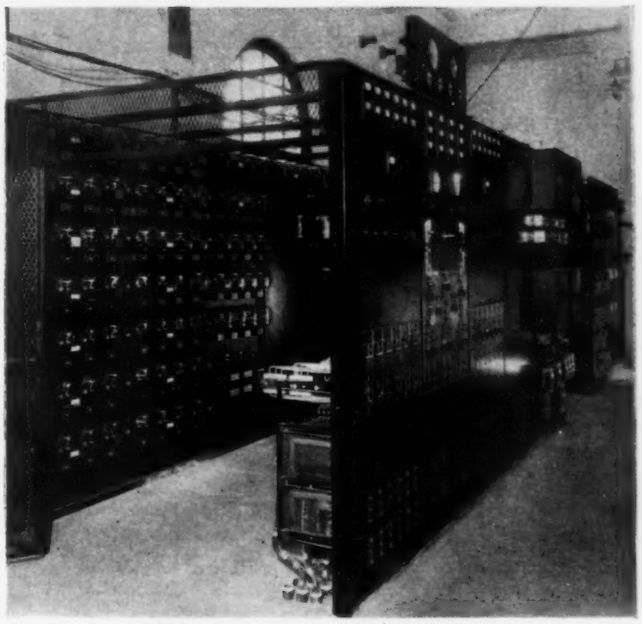


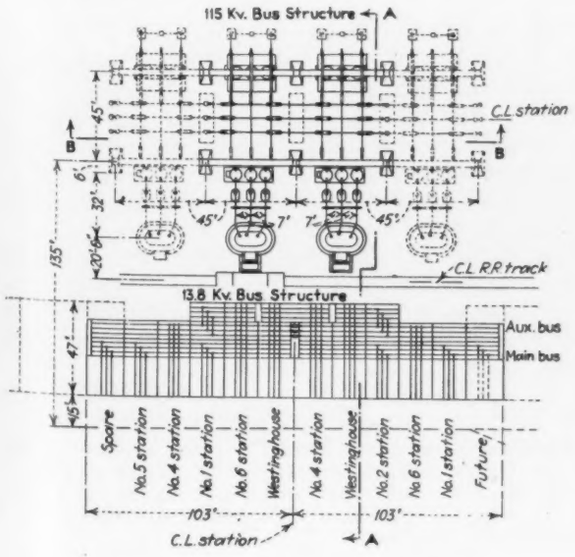
General view of 115-kv. yard of East Springfield substation

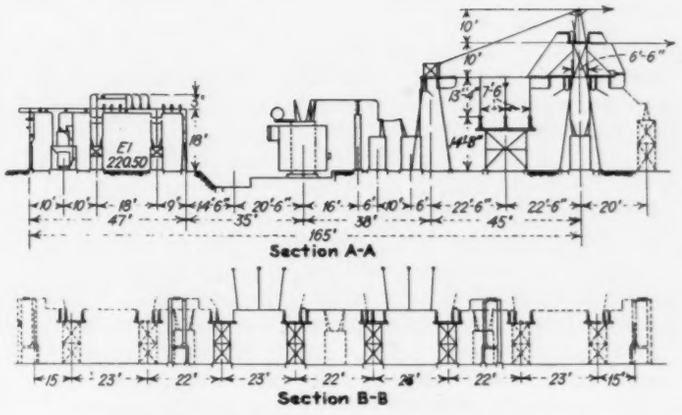
Control switchboard for East Springfield substation

on the top of the concrete conduit run. Over this box is a cover bolted onto the concrete. The leads from the top of the transformer tank to the roof bushing are flat bus-bar copper. A steel staging was placed in front of the transformer so that the station operator or the repairman may have easy access to the tap-changing mechanism on the transformer. On the top of the "Thyrite" lightning arrester are expansion joint connections which were made by the construction men on the work.

Inasmuch as the 115/13-kv. transformers are delta connected on the 13-kv. side it was necessary to install a grounding transformer to provide a ground on the 13-kv. system at this station. A direct-current junction box is used for the direct-current yard buses in order to supply seven oil circuit breaker direct-current solenoids from one pair of direct-current feeders taken from the substation battery bus. The use of these boxes saves more than 5,000 ft. of control conduit and more than 10,000 ft. of No. 4/0 direct-current feeder cable. An interesting type of retaining wall along the sides of the railroad cut was constructed by installing a paving on the bank with field stones set in concrete.







General plan and section of the (115/13-kv.) East Springfield substation

The control switchboard is of the miniature type. Each panel controls six circuits. A mimic bus on the front of the panel indicates plainly to the operator just how the yard is set up at any time, because the control switches with their red and green lights are set directly in the mimic bus. This switchboard was erected in an existing substation building, so the space was limited. There was not room enough to erect the relay panels with working space on each side, therefore the manufacturer furnished swinging panels which could be mounted back of the control board against the substation wall. All connections are carried from the swinging panels to the side wall and there connected to the control cables through terminal blocks. The panels are bolted closed, but can be unbolted whenever it is necessary to get at the terminal connection.

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Reflex Theory of Glare

By E. LEAVENWORTH ELLIOTT
Newmarket, N. H.

Glare arises out of abnormal physiological conditions which result from two general properties of illumination which may be roughly stated as *quantity* and *quality*.

More than twenty-five years ago Steinmetz called attention to the fact that mercury light is glareless under the practical conditions of illumination. A little later Prof. Frank Allen began a series of investigations which resulted in the discovery of a new principle in the physiology of vision, the importance of which has thus far been entirely overlooked by those interested in the theoretical basis of illuminating engineering. His discoveries afford a simple explanation of the physiology of visual fatigue and clear up some of the most baffling phenomena of color vision.

Briefly stated, Professor Allen found that there is a reflex action between the two retinas and between the two lateral halves of each retina. Light falling upon the retinas thus produces two different effects of opposite nature, one direct and the other reflex. The relation between these two effects varies with difference in wave length, the reflex action increasing in general with the frequency. Yellow produces the most powerful direct effect, which desensitizes the retina for waves of that frequency, while blue and violet produce the most powerful reflex effect, which sensitizes the opposite retina and the opposite half of the same retina for the *complementary* wave lengths, namely, yellow. Blue and violet have the most powerful reflex effect and yellow the most powerful direct action, the two being practically equal. Green produces the least of either effect.

It has long been known that monochromatic light is generally unpleasant to the eyes. Yellow produces intolerable glare, while blue and violet produce a peculiar psychological depression. Mercury light, which is as acceptable to the eyes as daylight, consists essentially of yellow, blue and violet, the latter in slight excess. These familiar facts are fully explained by the principle of reflex visual action. Yellow causes retinal exhaustion, resulting in visual fatigue, while blue and violet overstimulate. With mercury light the exhaustion produced by the yellow is fully counterbalanced by the stimulation of the blue and violet, resulting in a condition of balance between the two physiological actions. The same condition results from the action of daylight.

Considering, now, the well-known phenomena of glare in the light of Professor Allen's discoveries, the physiological causes of glare may be reduced to two sources: Excessive intensity of light over the whole or a well-defined area of the retinas, and light of such spectral composition as to produce an unbalanced condition between the direct and reflex retinal action. The use of green goggles, eye-shades and lamp globes is likewise accounted for, this color having a minimum effect of both depression and stimulation, and also cutting off the red rays, which are now known to be fatiguing on account of their high power-content.

The visual apparatus may thus be compared to the lighting system of an automobile; the lamps are the yellow rays, which run down the battery; the generator is the blue rays, which charge the battery. In order to keep the battery at normal capacity the charge and discharge must balance. Glare is the result of a run-down eye "battery."

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READERS' FORUM

About "A Foolish Exhibition"

To the Editor of the ELECTRICAL WORLD:

I wish to congratulate the ELECTRICAL WORLD for the editorial in the issue of July 8 entitled "A Foolish Exhibition." It is my opinion that this designation of the sorry attempt is correct. I am sure that the majority of the members present felt the same way. Such exhibitions certainly do not tend to add weight or dignity to the engineering profession. It is very unfortunate that the officials of the two societies permitted the presentation of any papers on this subject except on the basis of engineering facts and truths.

Chicago, Ill. **G. E. ACKERMAN.**

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Pressure Air Breakers Are Commercial

To the Editor of the ELECTRICAL WORLD:

Your July 8 issue of ELECTRICAL WORLD, on page 46, contains the statement that our new low-voltage breaker "is semi-experimental for both a.c. and d.c. circuits." This statement is incorrect. The development of the theory is not complete, but, as you are well aware, devices operate regardless of any amount of discussion upon their theory.

Arc extinction depends upon the pressure present in the barrel rather than upon its rate of rise. These circuit breakers have been thoroughly tested in the factory at full ratings, so that there is no question of experiment involved.

General Electric Company, Philadelphia. **D. C. PRINCE,** Engineer, Switchgear Department.

[The expression "semi-experimental" referred to the evolution of this breaker through an experimental process to a commercial device and to the fact that the theory of action is still incomplete. We are glad Mr. Prince called attention to the possible misinterpretation.—EDITORS.]

Men of the Industry

J. C. Guild, Jr., Heads Tennessee Utility

Jo C. Guild, Jr., for the past 5½ years vice-president and general manager of the Tennessee Electric Power Company, was elected president at a meeting of the board of directors held in Chattanooga in mid-July. He will continue to serve as general manager, and succeeds B. C. Cobb of New York City, whose letter of resignation was presented at the board meeting. The new president is a native of Chattanooga, was educated at Baylor School there, at the University of Virginia and at Vanderbilt University. His entire business career has been spent in the public utility field with the Tennessee Electric Power Company and its predecessor, the Chattanooga & Tennessee River Power Company.

Upon leaving Vanderbilt University in 1909 he engaged in construction work at the Hales Bar power plant, one of the outstanding projects of its character in the South at that time. Four years later, when that undertaking was completed, he became identified with the new business development work of the Chattanooga & Tennessee River Power Company, in 1915 assuming the duties of general manager of the company. When the Chattanooga light and power properties were combined with the traction properties to form the Tennessee Electric Power Company, in 1922, Mr. Guild was appointed vice-president of the combined companies. It was in 1928 that he became general manager in addition, the position from which he has advanced to the presidency.

His contact with the public early in his career made Mr. Guild an ardent advocate of the policy of maintaining amicable public relations, and when he assumed executive duties with the Chattanooga properties he put into practice what he had been preaching by disseminating information regarding the affairs and policies of the company.

B. C. Cobb, who resigned as president, was well known in Tennessee, having been active in 1922 in the organization of the Tennessee Electric Power Company and as chairman and president since 1925. At the present time he is chairman of the Commonwealth & Southern Corporation. Wendell L. Willkie, president of Commonwealth, was elected a director of Tennessee Electric Power.

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H. H. Broach, president of the International Brotherhood of Electrical Workers, resigned from that office recently. Ill health was given as the cause. Four years ago Mr. Broach assumed the presidency of the union. A man of unusual energy, he reorganized the union, stimulated organization campaigns throughout the country and sought to obtain union agreements in every field of the electrical industry. Rumors of his resignation had been current for some time following a long series of disputes in Local No. 3 of the International Brotherhood of Electrical Workers.

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Wheelock Whitney, local manager of the Northern States Power Company since 1924, at St. Cloud, Minn., has been elected president of the North Central Electric Association. A graduate of the Sheffield Scientific School, Yale University, Mr. Whitney served in the various departments of the St. Cloud Public Service Company, which was sold to the Northern States Power Company in 1924. He is the son of A. G. Whitney, former owner of the St. Cloud company. R. M. Houger, general manager of the Eastern Minnesota Power Company, Pine City, Minn., and of the Wisconsin Hydro-Electric Company, Amery, Wis., was named vice-president of the association. J. A. Hennessy, with the Northern States Power Company at Minneapolis, was named treasurer.

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Thomas U. White, formerly connected with the Automatic Electric Company, Chicago, has established a consulting engineering practice in that city under the name of Thomas U. White & Associates. Associated with Mr. White in this undertaking are Frank J. Schraeder, Jr., and Henry Blech, both patent attorneys and engineers. Mr. White is an electrical engineer with extensive practical experience and a pioneer inventor of industrial remote-control systems, automatic supervisory systems for controlling and supervising the operation of power devices, power and train dispatching systems and the like. Mr. Schraeder has had wide experience in the mechanical engineering field and has been actively associated with the development of automatic parking garages. Mr. Blech also has a broad background of experience in the electrical engineering field and has been actively associated with Skala Research Laboratories, Inc., for the past few years.

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OBITUARY

C. O. Dunten

Chester O. Dunten, president of the Oklahoma Power & Water Company, Sand Springs, Okla., died suddenly at his home in that city July 8, the victim of a heart attack. Mr. Dunten, who completed a course in electrical engineering at Purdue University in 1906, was associated with the Westinghouse Electric & Manufacturing Company and for a time with the General Electric Company before entering the public utility field with the Central Illinois Public Service Company of Springfield.

After a number of years' service with the Illinois utility he became general commercial manager for the Central & Southwest Utilities Company of Dallas, Tex., the position he resigned about eighteen months ago to join the Sand Springs company. It was just a year ago that he succeeded S. E. Wolff as president of the Oklahoma Power & Water Company.

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L. F. Leurey

Louis F. Leurey, consulting electrical engineer, San Francisco, died July 7 in that city in his fifty-third year after a lingering illness. A prominent figure in engineering circles in the West, Mr. Leurey is perhaps best known through his work with the Panama-Pacific International Exposition, held in San Francisco in 1915, where, as assistant chief mechanical and electrical engineer, he had direct charge of all field installation and operations. After graduation from Tulane University, New Orleans, Mr. Leurey spent two years with the General Electric Company and connections then followed with the New Orleans Railway & Light Company, Spokane & Inland Railroad, Stanislaus Power Company of California, Sierra & San Francisco Power Company and British Columbia Electric Railway Company. Since 1917 he had been engaged in consulting electrical engineering work, in this capacity having been re-

tained by many large electrical, industrial and mining companies of the West. Mr. Leurey was a past-president of the San Francisco Electrical Development League and a member of the American Institute of Electrical Engineers and the Engineers' Club of San Francisco.

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REUBEN H. BARBER, for many years chief engineer of the New Bedford (Mass.) Gas & Edison Light Company and for the past seven years chief steam engineer of the International Paper Company with headquarters at New York, died in a hospital at Hull, Que., July 12, as a result of injuries received in an automobile accident near that place on the day previous. He was highly esteemed in New England central station circles and was about 50 years of age.

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PAUL D. HOWSE, chairman of the board of directors of the Electrical Products Corporation, Los Angeles, Calif., died July 10 at his Los Angeles home following an apoplectic stroke suffered while he was driving his automobile. He was 59 years of age. Mr. Howse had been engaged in the electrical business in California since 1911. His affiliations with various branches of the electrical industry included, also, chairman Diamond Electrical Manufacturing Company, president Claude Neon Electrical Products Corporation, Ltd., president Crystalite Products Corporation, president Highway Communities Corporation, vice-president Electro-Therapy Products Corporation, Ltd., and member board of directors Electrical Products Consolidated.

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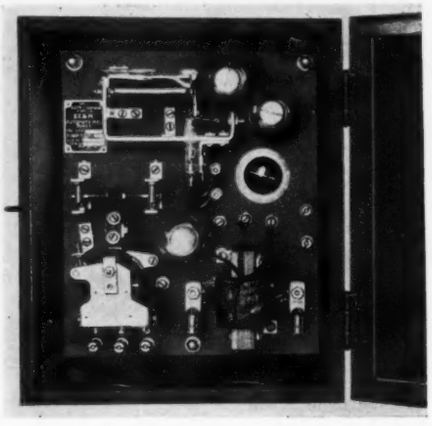
ALEXANDER CHURCHWARD, electrical engineer and inventor and for the last twelve years technical director of the Wilson Welding & Metal Company of North Bergen, N. J., died of heart disease, July 11 at his home in South Orange. He was 61 years of age. In the course of his career Mr. Churchward worked for Henry Ford and Thomas A. Edison. More than 200 patents in the electrical, radio and automotive fields were obtained by him and both Mr. Ford and Mr. Edison purchased several from him. He was born in Ceylon, India, of British parents and obtaining his education in England, came to the United States when he was eighteen years of age, entering the employ of the General Electric Company. Later he established a consulting engineering practice. During his association with the Wilson company Mr. Churchward became an authority on electric welding, patenting the Wilson welder and writing many articles on this subject for the technical press. He was a member of the American Institute of Electrical Engineers.

New Equipment Available

Automatic Weld Timer

For use in connection with resistance welding machines, Electric Controller & Manufacturing Company announces the EC&M automatic weld timer. This timer does not provide a definite amount of time for each weld, but varies the time automatically in inverse proportion to the rate of current flow to produce a 100 per cent weld at each operation. The standard type of automatic weld timer consists of a rectifier tube



which charges a fixed condenser in proportion to the rate of current flowing in the welding circuit. When the charge reaches an amount sufficient to pass current through two neon-gas-filled tubes a small relay is operated, which in turn opens the relay controlling the main line contactor. The tubes are in the circuit only when the welding current is on, so that as soon as the main welding circuit is opened the weld timer is ready for the next operation.

Various other forms of weld timers are supplied where required. One is the automatic repeat type which has an additional timing element to govern the length of time the electrodes are apart. Another style, known as the non-beatable type, is furnished where it is desired to prevent the operator from separating the electrodes from the work before the welding current has been interrupted.

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A COMMERCIAL SODIUM VAPOR LIGHTING UNIT known as the "Sodium Lab-Arc" has been announced by the General Electric Vapor Lamp Company, Hoboken, N. J. It is designed for physical and optical laboratories and furnishes a powerful, steady source of sodium lines, which will materially aid in many laboratory procedures. The compact, self-contained unit operates directly from a 110-volt, 60-cycle a.c. source.

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Automatic Voltage Booster

An automatic voltage booster which when the load falls and the line voltage rises will automatically be taken off the line has been announced by Ferranti, Inc., New York. The booster is so operated that the line is not open-circuited, electric clocks are not affected, nor will no-voltage releases on motors operate. This feature is essential in order to prevent the frequent stopping of motors and clocks. A time-delay element prevents the booster from operating instantaneously, as otherwise it would operate with every change of voltage, even if of only short duration, such as the starting of a motor.

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New Test Set Produced

Roller-Smith Company, New York, N. Y., announces a new test set consisting of the type CSO split core transformer with either a type PA or type steel-six ammeter.

With this new test set it is possible to obtain alternating-current ampere readings as low as ½ amp. and as high as 200 amp. While the ammeter was designed especially for use with the type CSO transformer, it may be used separately as a self-contained, double-range instrument. The ammeter has two ranges, the lower range being 2.8 amp. and the high range 15 amp., when used without the transformer. When used with the transformer two additional ranges are provided, namely, 40 and 200 amp. When using the transformer it is not necessary to open the circuit to be tested as the transformer may be opened to a sufficient extent to slip over a cable or busbar.

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TYPE HCP PREPAYMENT METERS, which are built in all single-phase capacities from 5 to 25 amp. inclusive, both two-wire and three-wire, have been announced by the Sangamo Electric Company, Springfield, Ill. The coin mechanism is arranged for the U. S. quarter. By appropriate gear change wheels, any kilowatt-hour rate from 3 cents to 15 cents, varying by ½-cent steps, can be secured. The total of the money inserted, the unused kilowatt-hours and the total kilowatt-hours are all registered on appropriate indicating circles.